

The
BIRD BOOK
...
Charles D. Hoffner

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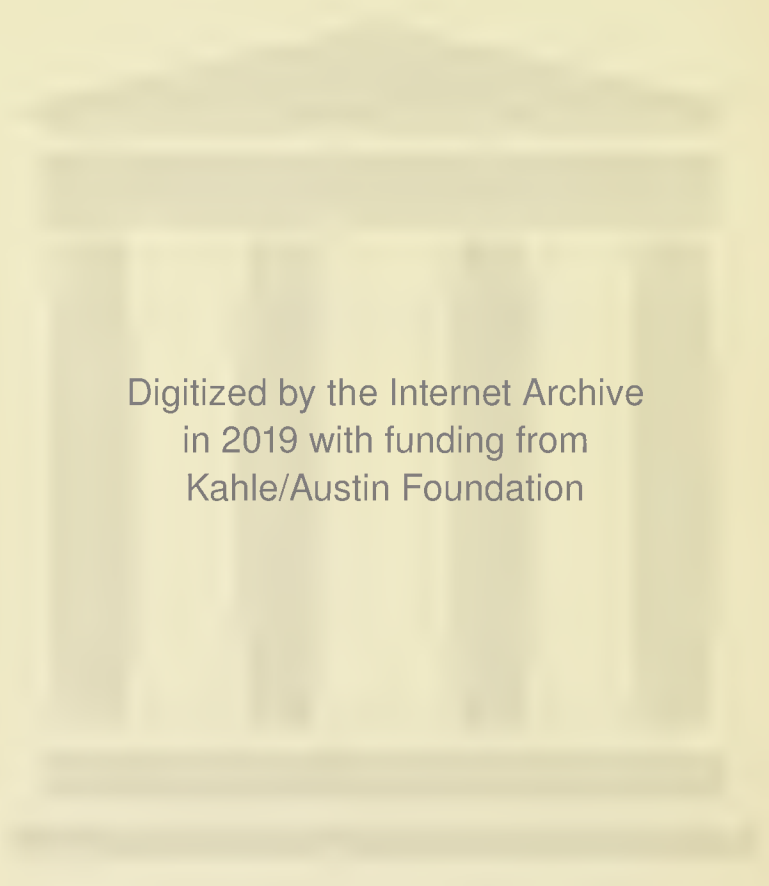
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A. BRADY

A. Beady

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THE BIRD BOOK



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CHARLES P. SHOFFNER

THE BIRD BOOK

*A new book for bird-lovers,
teachers and students, with
more than 500 questions
and answers*

BY
CHARLES P. SHOFFNER



RICHARD MANSON · PUBLISHER
NEW YORK

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RICHARD MANSON

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*Dedicated to bird lovers everywhere, but
especially to our instructors, who are doing
so much to teach conservation to the youth
of America.*

Charles D. H. H.

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THE BIRD BOOK

FOR YOU

BIRDS have always fascinated me. I studied them from a practical viewpoint, and the more I studied the greater my wonder became that all folks, big and little, were not bird lovers.

In January 1913, the late Wilmer Atkinson, beloved Editor and Founder of *The Farm Journal*, and I started the Liberty Bell Bird Club. The Club had but one idea in view—"To save the birds." Up to July 1929 there were 917,689 members who had signed its pledge. Without the wonderful resources of *The Farm Journal*, this Club would have been impossible.

After thousands had joined, and many school clubs were formed, teachers all over this country began writing for help in directing their Friday afternoon bird programs. The regular textbook is not suitable. It must contain facts easily found. A teacher's time for special lessons is limited.

There are many excellent bird books on the market, and much of my knowledge of the birds came first from these books. Teachers, though,

seemed to want something different. The bird books had all the facts, but in presentation they were not just "it" for their particular purpose.

After many talks with teachers, many letters from teachers, and many talks with children, this book, as here given, was evolved.

Perfect? by no means, but it is an earnest effort to teach something about the birds and bird conservation that would be suitable for the individual, for the school, and for bird-club work. It is not a technical bird book.

My greatest help was from the late Dr. B. H. Warren. No greater practical ornithologist ever lived. Much information was also secured firsthand from the Wallops Island Liberty Bell Bird Club Sanctuary. Here, Dr. Warren and I studied the birds early and late.

Again, I have learned much from Dr. A. K. Fisher, Dr. Witmer Stone, Dr. Frank M. Chapman, Edward H. Forbush, Dr. L. O. Howard, Herbert K. Job, Henry W. Henshaw, Dr. T. S. Palmer, Edward H. Parry, W. L. McAtee, and many others whose names are enrolled on the birds' Roll of Honor.

Many of the articles, games and illustrations in this book have been reprinted through the kindness of the publishers of *The Farm Journal*, and to them, and many other of my bird friends, I give my sincere thanks.

May this book be a friend indeed, to you, and help you over many rough places in your practical study of bird life.

Don't forget a bird demands just four things: (1) protection from enemies; (2) a safe home where the young can be raised; (3) abundant food and water, and (4) congenial surroundings. And "THE BIRD BOOK" will show you the way.

A handwritten signature in cursive script, reading "Charles S. Shoppes". The signature is written in dark ink on a light background. The first letter "C" is large and loops around the first part of the name. The signature ends with a long, horizontal flourish.

CHAPTER I

OUR FEATHERED FRIENDS

BIRDS are lower in the organic scale than the class of mammals which includes man, the four-footed animals, the bats, the seal, and the whale.

Our scientific brethren tell us that birds are closely related to reptiles, and a fossil bird discovered many, many years ago, called the "Archaeopteryx," had teeth and two fingers on each wing. The bird of *today* is something entirely different, and there is no subject of greater interest in the wonderful plan of organic nature, than the study of the living bird.

Remember that the bird has a particular job to fulfil, and nothing in Nature can take its place. This job is to preserve the balance of Nature's forces.

Our vast army of insectivorous birds is one of the greatest factors in checking insect life; but it must not be forgotten that the vegetable food of birds is also important—they destroy countless numbers of destructive weed seeds, and also act as agents in the distribution of plants. In addi-

tion to these factors, birds are serviceable in their work as scavengers. They eat the decaying matter that would pollute our air, our earth and our water.

It is said there are 13,000 species of birds known to science. W. L. McAtee states there are more than 800 distinct kinds of birds in the United States. They consist of sixty-nine families, of which twenty-three families are classed as waterfowl, seven as shore-birds, four as upland game birds, six as birds of prey and forty-three as song birds or other land birds.

Birds have one feature that is entirely different from every other living creature—that is, feathers. This marvelous covering is light, has great strength, and is ideal for the purpose for which it was intended.

The construction of a bird is marvelous, and the widely different forms are accompanied by habits just as widely different.

Birds have no teeth. They breathe more rapidly than mammals or reptiles. Their temperature ranges from 100° to 112° Fahrenheit. In mammals it is 98° to 100°, and in reptiles it averages about 40°.

All birds have wings, but some birds, such as the ostrich, can not fly. Other birds, like the loons, are so water-loving that they are almost helpless on land, but their speed under water is marvel-

ous. Penguins walk long distances and remain on land through the breeding season. The swifts, with their long wings, have such tiny feet that they are useless on land, but they are true birds of the air.

A hummingbird is about three and three-fourths inches in length and weighs but a few ounces. An ostrich is eight feet high and weighs around three hundred pounds.

Birds range from pole to pole. They are at home amid the Arctic snows, the hot-blinding desert, the densely-forested Tropics, the sea-shore and in the lovely temperate climate.

To us, the birds are interesting in a scientific, aesthetic and economic manner.

AESTHETIC VALUE

We shall leave the dead birds to the scientists, but in this book we will treat the living birds in their relation to us as a beautiful adjunct to life, and as an economic necessity.

Of all the creatures on this earth, birds seem to be the happiest, yet their enemies are many. While many of our small birds have a very short life, there are others that live to be a hundred.

The greatest traveler among mankind is a homebody compared with some of our birds which travel 11,000 miles twice a year.

With all our training, our knowledge of direc-

tion is infantile beside that wonderful sense of the birds which will bring them back to their nesting places from a distance of thousands of unmarked miles. All our wonderful airplanes are feeble compared with the flight of a bird. Did you ever study the flight of an eagle, or the soaring of a gull?

The finest manufacturer of our most beautiful dress goods, dyed with exquisite colors, is so easily outshown by the coloring of our birds that there is no comparison. What man with a man-made machine can match the ruby-throated hummingbird's gorgeous dress?

The birds, with their beaks, can do such tasks that put to shame our skilled workers. A bird's eye is a marvel compared to ours.

The family life of some of our feathered friends is a lesson in love, tenderness and devotion. The cowbird and some others are exceptions.

We all pay perfectly good money for opera seats to hear human beings sing. The sopranos, tenors, contraltos and bassos are all marvelous, of course, but what adjective do you apply to the song of a hermit thrush?

ECONOMIC VALUE OF BIRDS

Keep in mind that our insectivorous birds' chief work is to keep in check insect pests. Now read on:

Scientists believe that the human race once inhabited only the Tropics, and that but for the insects, the majority of us would still be there. It is our natural dwelling-place—otherwise why should not Nature have provided us with feathers, or furs? Early man lived under the warm sun, where necessities were few, work hardly necessary, and Nature very kind. It is probable, though open to discussion, that the insects drove him out, and keep him out; and not content with that, they followed man as he followed the retreat of the great Ice Cap, and have never flagged in their ceaseless war on his food, his health, and his comfort.

The insects wage eternal warfare on us, pitting their tiny size and incredible numbers against our strength and trained intellects. They attack our food, our shelter, our clothing, and are all the more terrifying because they do it blindly, instinctively, without the least animosity toward us.

THE NUMBER OF INSECTS

The number of insect species is greater by far than that of all other living creatures combined.

More than 300,000 species have been described, and there are many thousands of undescribed specimens in museums, and probably more outside of them. A small cherry tree, ten feet in height, was found to be infested with plant-lice.

By careful computation, Dr. Fitch estimated there were 12,000,000 lice on this tree, and it was only one of a row similarly infested.

After a heavy storm, I have seen on the shores of Wallops Island, Virginia, countless millions of potato-beetles which have been swept from fields, to streams, streams to rivers, rivers to ocean, to be cast on this shore. Apple trees are attacked by 176 different species of insect pests, and 500 different species attack the oak tree.

A FAMILY OF 10,000,000 IN ONE YEAR

Insects are enormously productive. If one pair of Colorado potato-beetles was allowed to increase without molestation, in one season, where they breed three times, the progeny would amount to more than 10,000,000. The late Dr. Litner said that in the study of the hop-vine aphid, Professor Riley observed thirteen generations in one year. If we assume the average number of young produced by each female to be 100, and that every individual attained maturity (which, however, never occurs in Nature), the number of the twelfth brood alone (not counting all of the preceding broods of the same year) would be ten sextillions of individuals. Mr. A. H. Kirkland has computed that the unrestricted increase of the gipsy-moth would be so great that the progeny of one pair would be numerous

enough in eight years to devour all the foliage in the United States.

THE APPETITE OF INSECTS

Mr. Forbush states that many caterpillars daily eat twice their weight of leaves, and that a certain flesh-feeding larva will consume, in 24 hours, 200 times its original weight. There are vegetable-eating caterpillars which, during their progress to maturity, within 30 days, increase in size 10,000 times. Mr. Leopold Trouvelot, in an accurate study of the American silkworm, says that a worm 56 days old and weighing 207 grams has consumed not less than 120 oak leaves, weighing three-fourths of a pound, and has drunk over half an ounce of water.

ANNUAL LOSS BY INSECT PESTS

The annual loss to agriculture in the United States caused by insect pests amounts to at least \$1,000,000,000. In fact, the Department of Agriculture at Washington estimates that the loss equals, if it does not exceed, 10 per cent. of the entire production. Every farmer feels it, from the small truck gardener to the owner of the big wheat fields of the West. The damage done by the Colorado potato-beetle, the chinch-bug, the Hessian fly, the boll-weevil, and the hundreds of minor pests can hardly be estimated in dollars

and cents. The late Dr. Davey, the celebrated tree surgeon, says: "A \$100,000,000 loss to trees is caused in the United States yearly by reason of the decrease in the number of native song-birds. If we could get plenty of native song-birds, no tree would be troubled by insects."

These are but a few illustrations. In summing up the damage done by insects remember this; a great fact of biology is the incessant war between insects and man.

It is clearly within the bounds of probability that insects could make this world a desert and destroy the human race.

Insects prey upon every kind of vegetation that man produces.

Insects prey upon all domestic animals.

The multitude of insect pests which the farmer has to battle with is due largely, if not entirely, to the upsetting of nature's laws by man.

Spraying is fairly successful in combating insect pests, but each year more spraying must be done. Spraying is a makeshift and not a cure, and the expense is enormous. Each year new pests appear.

NATURE IS CLOSELY BALANCED

Every thinking person must realize that the natural world, as we see it before man upsets it with his rough and heedless fist, is the result of

countless centuries of adjustment and reacting forces. Long ago it reached a state of balance, where every living thing has its means of support, its enemies, seeks and finds its food, and is in turn the prey and food of some other of Nature's children. Any artificial check or change in the balance might easily cost a century of trouble before the slow processes of Nature could make the necessary readjustments.

Man has made many arbitrary changes in the arrangements of Nature, and generally to his sorrow, but nowhere has he shown such ignorance, such greed, such brutality, and such thorough-going, incredible stupidity as in upsetting the perfect balance of bird life.

A French naturalist has estimated that if the birds were all to disappear, man could live on the earth only nine years. For without the birds, all plants and trees and vegetables would disappear; the caterpillars and insects would eat them root and branch. When that happened, the cattle and the sheep would not have enough to eat and they would all die. Mankind, unable to survive on fish, or on the insects themselves, would perish miserably in a horrible, crawling, creeping world.

INSECTS EAT CROPS—BIRDS EAT INSECTS

Our insectivorous birds can devour an incredible number of insects, and their nestlings

require more of this food, in proportion to their weight, than do the adult birds. Birds digest their food very quickly. Professor Beal says: "The stomachs of birds are often packed so hard and tight with food that it is a wonder how digestion can go on, but it does, nevertheless."

If we had enough birds they could control, or at least keep in check, the insect world. The food of our birds is described in detail in a later chapter.

MAN—THE GREATEST EXTERMINATOR

It is almost universally believed that from the beginning of time, man has been the greatest natural enemy of birds and exterminator of the various species. Man with his gun, trap, cat and dog has been directly or indirectly responsible for the great decrease in bird life. Directly, by wanton killing of birds, and indirectly by destroying the right balance of Nature by using his power to kill in the wrong manner.

According to Dr. Hornaday, bird life in this country has dwindled 75 per cent. in sixty years. Thirteen species of migratory birds have been entirely exterminated and thirty more are traveling the same road.

IT IS WAR

Let me repeat, this is not merely an amusing story and I am not dealing in figures of speech.

The human race is fighting for its food, which is its life. The farmer knows this and the city folks are learning.

Parasitic insects are said to be the greatest check on insect increase, nevertheless in this ceaseless war with the insects we need the help of our natural allies, the wild birds. Since we have crippled these allied forces, we are slowly losing the war, in spite of everything we can do with poisons and traps. Let us reverse our policy toward these feathered friends, as our own lives and the lives of our children may depend on the birds' willingness and ability to help. Let us treat the birds as allies, remembering that they *must be paid* like any other soldiers. They ask very little—only protection from mankind, instead of injury and death. Surely there was never any army that fought so mighty a war so cheaply.

CHAPTER II

QUESTIONS ON "THE BIRD"

(THE ANSWERS IMMEDIATELY FOLLOW)

1. To what are birds closely related in structure?
2. Do birds have teeth?
3. Did any of the prehistoric birds have teeth?
4. In what ways do birds surpass all other vertebrate animals?
5. What is the temperature of birds?
6. Why do birds require so much food?
7. Do birds gorge themselves if food is plentiful?
8. Which the largest bird in the world?
9. Which is the smallest American bird?
10. Is a chicken a bird?
11. Is a bat a bird?
12. How do birds sleep?
13. Is the nest used for a bed?
14. Where do the perching birds, such as the robins, bluebirds and orioles sleep?
15. Do birds sleep in the snow?
16. Where do water birds sleep?
17. How do quail, or bob-whites, sleep?
18. Which birds sleep standing?
19. Which birds sleep standing on one leg?
20. Which birds sleep hanging by their claws?
21. Which birds sleep in great flocks?
22. How is a bird built so as to aid it in flying?
23. What prevents a bird from tipping over?

24. How is a bird's head fastened to its body?
25. What peculiarity is there about birds' bones?
26. Can a bird fly higher than the height at which a man can live?
27. Can a water-bird make his body heavy at will?
28. What is a permanent resident?
29. What is a winter visitant?
30. What is a transient visitant?
31. What are summer residents?
32. Which bird is believed by many to be the most useful to mankind?
33. How many birds prey upon our crop pests?
34. Which is the only bird in the world domesticated exclusively for its feathers?
35. Do birds exhibit the traits of mankind?
36. Which birds have a monument erected to their honor?
37. Do ducks raised for commercial purposes need water in which to swim?
38. Which European bird builds its nest upon the chimney tops and is considered to bring good luck?
39. Which bird that was once here by millions is now extinct?
40. How does the weight of a bird's brain compare to the weight of a man's brain?

ANSWERS TO QUESTIONS ON "THE BIRD"

1. Birds are related to reptiles. They are lower in the organic scale than the mammals which include man, the four-footed animals, the bats, the seal and the whale.

2. Our birds of today do not have teeth.
3. The Archaeopteryx of the past, had teeth. This bird lived in the Jurassic Period. It had two fingers on each wing, and a long reptilian tail covered with feathers.
4. In breathing power or lung capacity, and in muscular strength and activity, birds surpass all other vertebrate animals.
5. The temperature of birds is higher than in any other animal. It is from 100° to 112° . Naturally the circulation is more rapid.
6. The rapid circulation and great activity of birds quickly burn up their food. As it is quickly assimilated, more must be eaten.
7. Birds often eat until the crop is greatly distended. I have seen a bird's stomach cut open, which contained so many insects that they shot out in all directions. It would be impossible for man to pack so many in such a small space.
8. The ostrich is the largest living bird. It is about eight feet high and weighs 300 pounds.
9. The ruby-throated hummingbird is our smallest bird. It is three and three-fourths inches in length and weighs but a few ounces. The smallest bird in the world is the vervain hummingbird of the West Indies.
10. A chicken is a bird.
11. A bat is a mammal and not a bird.
12. At night, birds bury their heads in the feathers on their shoulders, but never put their heads under their wings. Most birds sleep on their feet, squatting down, but a few sleep standing up on one leg, with the other one drawn out of sight.
13. The nest is seldom used as a bed except by the



Charles P. Shoffner at Wallops Island, Virginia



Charles P. Shoffner, Hudson Maxim, Ex-Governor Sulzer of New York, and Felix Shay at the Roycroft Shop, East Aurora, New York. All Roycrofters are bird lovers

mother when she is sitting or keeping her young warm.

14. The majority of birds creep into the thick branches of an evergreen or some other leafy tree and cuddle up close against the trunk. Some birds crawl under the edge of a haystack. Others sleep in a tangle of thorny berry bushes. Tree sparrows often sleep in little holes in the ground. At night, birds have a two-fold object in view—to sleep and to hide from their enemies.
15. Very often birds sleep in the snow and they do not seem to mind it. Snow protects the birds from piercing winds. Grouse will dive into a snow bank, sit down and let the snow cover them. Air comes through the snow so they are in no danger of suffocating.
16. Water-birds often sleep on the water, where they float all night long like downy boats. Some ornithologists say they usually leave one foot hanging down which acts as a paddle and keeps them from being washed ashore.
17. Bob-white and his family sleep in a close circle on the ground with their heads turned outward. Thus you see they are always prepared for enemies no matter from which way they come. This formation keeps them together, and also in winter, helps to keep them warm.
18. Hawks and eagles are said to sleep standing. They are always prepared to fight or flee.
19. Ducks and geese, at times, sleep standing on one leg. The domestic duck usually squats.
20. Chimney swifts and the woodpecker family sleep hanging up by their claws, but they use their stiff tails as a brace.

21. Crows sleep in roosts in great flocks. After the young are raised, robins, blackbirds and chimney swifts also sleep in big colonies.
22. A bird is built like a boat, sharp in front so as to cut its way through the air. As it flies, its feet are drawn up or trail behind and all the feathers lie backward, so there is nothing about its build to hold it back.
23. A bird's weight is mostly below the wings, so it is not top-heavy.
24. A bird's head is fastened at one place, very much like a hinge. That is the reason it can turn its head around so far. Few creatures can turn their heads as far back as a bird.
25. Many of the bones of birds are hollow and there are air-sacs under the skin. They can fill these sacs with air, so that water-birds can not sink, but float like a cork.
26. A bird can fly to such heights that the air would be too rarefied for man. Birds have many remarkable powers.
27. Grebes and other water-birds can sink their bodies in the water, leaving only the tips of their bills above the water.
28. A permanent resident is a species that does not migrate, but is found in one locality throughout the year.
29. Winter visitants are species that arrive from the North in the fall, stay all winter and return to the North in the spring.
30. A transient visitant is a species that during migration, both in the spring and fall, visits us for a week or a month and then passes on.
31. Summer residents are species that come from the

South in the spring, rear their young and return South in the fall.

32. The quail is believed by many to be our most useful bird. In spring and summer it destroys countless insects, and in the fall and winter, eats an enormous amount of harmful weed seeds.
33. It is estimated by W. L. McAtee that the total number of birds that prey upon our crop pests each season is probably more than 4,500,000,000.
34. The ostrich is the only bird in the world that is domesticated exclusively for its feathers.
35. Birds apparently exhibit practically all the traits of mankind. They love and hate, show fear, courage, jealousy, anger, pleasure, vanity, virtue, vice, fickleness, generosity, selfishness, pain, curiosity and memory.
36. A beautiful monument in Salt Lake City, Utah, is said to be the only monument in the world erected by a grateful people to any bird. It commemorates an event which occurred in 1848 when Salt Lake City was less than one year old and contained but 1,800 inhabitants. In the spring of that year the ground had been tilled, and potatoes, corn, wheat, oats, peas and beans planted. Much depended upon the harvest, not only for the people already there, but for 2,500 additional immigrants who were about to join them. Supplies were getting very low, and if the harvest failed, the pioneers did not know what would become of them.

About 900 acres had been sown with winter wheat which was just beginning to sprout, when an unlooked-for calamity occurred—a plague

of crickets. In May and June these destructive pests rolled in black legions down the mountain sides and attacked the fields of growing grain. The tender crops fell an easy prey to their voracity, and the ground looked as if scorched by fire.

The entire community, men, women and children, gathered to fight the ravenous pests. They beat them back with brooms and clubs, turned water into trenches to drown them, burned them by the thousands, and still the crickets increased. Despite all that could be done by the settlers, the hope of a harvest vanished—the harvest that was to do so much for them. The Mormons prayed long for relief, then the unexpected—the miracle, as many believed, occurred. In the midst of the work of ruin, when it seemed as if nothing could save the crops, a rushing sound was heard and great flocks of gulls appeared, filling the air with their white wings and plaintive cries. At first it looked as if they came to help the crickets in their work of destruction, but their real purpose was soon seen. They began at once to prey upon the crickets. All day long they gorged upon them, the white gulls upon the black crickets, until the pests were vanquished, and a good portion of the crops saved. The gulls returned to the Lake Islands, leaving the grateful settlers to shed tears of joy over their apparently miraculous deliverance.

A scarcity of food followed, but no famine. The gull is still to be seen in the vicinity of Great Salt Lake, and the killing of these birds is punishable by law.

37. The best egg-laying runner ducks are better off without a pond. A constant supply of fresh water in tubs deep enough for them to immerse the whole head, is all that is necessary for their health and well-being.
38. The stork builds its nest upon the chimney tops and is considered to bring good luck to that particular household.
39. The passenger pigeon, as late as 1870, seen in such flocks to be one of the bird wonders of the world, is now extinct. The last captive passenger pigeon died in the Zoological Park, Cincinnati, Ohio, September 1, 1914.
40. The brain weight of a man compared to his body weight is 1 to 35; but in a hummingbird it is 1 to 12. Think of the brain in such a tiny mite of a bird. Of course there are smaller brains in other forms of life.

CHAPTER III

THE MIRACLE OF BIRDS' MIGRATION

OUR beautiful birds, that is most of them, take two long journeys every year. One in the fall to the South and the other in the spring back to the North. This is called migration.

Volumes have been written on this subject and there will be many more to follow. There are few subjects in natural history that have caused so much interest to mankind as the appearance and disappearance of the birds with the seasons. There was a time when folks believed that some birds hibernated in hollow trees like the bears in their caves, and that others, like the swallows, burrow into the mud as do frogs.

When travelers visited distant parts and found the same birds there in winter that they had had in summer, they realized that the birds must migrate. They could see how the big birds, like the hawks and herons could fly great distances, but they could not understand how the little birds could do so. Therefore, they reasoned that the big birds must carry the little ones on their backs.

We can find illustrations in some old geographies showing small birds riding across the Mediterranean on the backs of storks.

Today these pictures seem ridiculous for we now know that the vast majority of birds, even the tiniest hummingbirds, make wonderful journeys to and from their breeding grounds each year and always by their wonderful gift of flight.

All birds, though, do not travel the same distance. From the birds that do not migrate at all, to those that traverse nearly the whole extent of the globe, there is almost a complete series. The habit of migration has been evolved through countless generations and during this time the physical structure and habits of birds have undergone a process of evolution.

It is indeed a powerful instinct that causes birds to repeat each year these long and arduous journeys at precisely the same time. In all Nature, there is no stronger instinct than the reproductive one, and it is this irresistible force which is the immediate cause of bird migration.

All winter in their southern homes, the birds lead a care-free life, fattening in the land of plenty for the strenuous tasks ahead of them—the spring journey to their breeding grounds, and the nesting season. These birds leave when the food is at its height.

Before they start on their northward flights,

the reproductive organs begin to enlarge and it is this physiological change which drives them on their journey.

THE SPRING MIGRATION OF BIRDS

A bird's year may be divided into: (1) winter, or passive state, when the principal occupation is the search for food; (2) the spring migration northward; (3) mating; (4) nest-building and laying of eggs; (5) hatching and rearing of the young; (6) molting ; and (7) the fall migration southward.

The great variety of birds can be seen during the spring migration, and many rare ones, that spend the summer in the far North and winter in the tropics, frequently stop over for a day or so on their southward journey.

The ones that arrive first are naturally those which have the shortest distance to travel—the meadow larks, robins, bluebirds and blackbirds.

The coming of these early birds is not so regular as the coming of the later ones, because the weather is not settled. Unseasonable warmth will hurry them north and storms and cold waves will retard them. The different species of birds arrive about the same time every year, although the weather, by affecting the food supply, determines the date. The first arrivals are usually males.

During April and May, however, the number of species migrating increases, and they become more and more punctual in their arrivals. By the middle of May, in the latitude of Philadelphia, when the weather is warm and settled, the height of the migration occurs. At this time, every hedgerow and ravine, and even the trees of city streets, are filled with the bright, flitting forms of warblers, vireos and flycatchers. The northward migration is practically over by June 1, ending rather abruptly with the passage of the shore-birds.

A very important feature in the study of migration is the certainty with which a bird returns to the region of its birth.

Since the banding of birds has become scientific, we have proved this fact. Many interesting experiments have been performed with terns, taken from their nest and liberated in mid-ocean. These birds always were able to return to their former homes, but how the migrating birds find their way between their winter and summer homes is practically unknown.

This wonderful instinct which guides birds on their way has been called a sense of direction, but as yet very little is known about it. The power of this "sixth sense" can not be fully appreciated until one has kept a bird calendar for several years and has seen how punctually the birds

arrive year after year. This "homing instinct" is worthy of our deepest study. Millions of our small birds, annually cross the Gulf of Mexico in a single flight. That means a journey of from 500 to 700 miles without a stop.

Generally, migrating birds fly from 20 to 27 miles an hour at an altitude of about 3,000 feet and a day's journey is about 150 miles. Of course, there are many exceptions.

THE FALL MIGRATION

Throughout North America the birds that live in the colder part of the continent fly south for the winter. In South America there is a similar, though not so marked, a movement from the colder to the warmer sections. If our birds did not go south they would perish, and if they remained in the South later than spring, there would be an over-crowding.

As soon as the nesting season is over, there are signs of the fall migration. In the middle states a few shore-birds may be heard flying overhead uttering their loud, clear whistles on their way south as early as the beginning of July. The swallows begin to flock, getting ready for their southward journeys, about the middle of July; and a general southward movement of warblers may be noticed by the middle of August.

The extent of a bird's migration is generally governed by the nature of its food. Berry- and fruit-eaters migrate far enough to secure an ample supply. Insect-eaters do the same, but they generally fly farther southward than the berry-eaters, though the kinglets, nuthatches, and chickadees stay well to the north.

Birds, in migration, follow different routes. Food supplies, en route, is believed to have been the determining factor in the choice of one route in preference to another, and not the distance from one base to another.

The different routes taken by the birds are almost as numerous as the bird families that travel them. The Bureau of Biological Survey of the United States Department of Agriculture has a map showing the seven principal routes used by our birds in their migration between North and South America.

The nuthatches and woodpeckers that come to our feeding stations in winter, spend their entire lives in one locality. The ruffed grouse very often lives its whole span of years in a single wooded ravine. The robins, bluebirds and blackbirds winter in Southern United States; the orioles go to Central America; many of the warblers and thrushes go to Northern South America; our familiar bobolinks that bounce over the daisy fields in June, spend the winter on the pampas of Bra-

zil, about 5,000 miles from their breeding grounds.

The greatest travelers of all are found among the shore-birds, some of which journey to Patagonia, the southernmost part of South America, and occasionally to the islands of the Antarctic Ocean.

The golden plover nests along the Arctic coast and winters in Argentina. In its fall migration, this bird takes a straight course across the ocean from Nova Scotia to the coast of South America—2,400 miles without pause or rest.

The champion traveler of all is the Arctic tern. The winter and summer homes of this bird are about 11,000 miles apart, making a distance of 22,000 miles which it travels yearly.

The migration of warblers is a wonderful sight. They leave rather late in summer or early in the fall. This is necessary as they are thinly feathered and almost exclusively insect-eaters. They spend nearly three-fourths of their life in the Tropics. During migration, a dozen or more species of warblers, with birds of a different character, such as nuthatches, creepers and juncos, will be found flying over our heads and in the darkness of night you can hear their call notes clear and distinct. The warblers winter in the West Indies, Central America and South America.

Some birds molt before they start south, others molt en route. The young golden plover is white breasted when he flies over the Atlantic Ocean in the fall; as he crosses the Gulf of Mexico the following spring his breast has become jet black. The male scarlet tanager, during fall migration, is a uniform olive-green with black wings and tail, but he returns next spring in brilliant black and scarlet. The bobolink goes south marked with buff and brown—he returns in black and white.

Much about migration remains to be discovered. The chimney-swifts in the fall can be traced to the Gulf of Mexico, then they disappear. We do not know exactly where they go, but in the following April a twittering is heard and they have returned from the unknown.

Keep an accurate record of when the different birds depart, which birds pass through while migrating, and when the winter visitants arrive. Note how these birds act, and what they eat. Try to keep some of the migrants by furnishing comfortable nesting houses for shelter and by supplying food.

ANCIENT ACCOUNTS OF MIGRATION

What is said to be the oldest account of migration is a fresco painting in the tomb of Rhotep of Medum, Egypt. This tomb is older than

the great Pyramid, so this wall-painting must be at least 6,000 years old.

It shows six geese of three species so accurately drawn as to be recognized by us today. These geese are the red-breasted goose which nests in Western Siberia; the gray lag, which nests in Northern Siberia and Northern Europe, and the white-fronted which nests in Europe and Arctic America. These geese winter on the Nile.

Turn to your Bibles and in "The Song of Solomon" 2:11-12 read "For, lo, the winter is past, the rain is over and gone; the flowers appear on the earth; the time of the singing of birds is come, and the voice of the turtle (dove) is heard in our land."

Jeremiah, the old prophet, 2,600 years ago writes in Jeremiah 8:7 "The stork in the heaven knoweth her appointed times, and the turtle dove and the crane and the swallow observe the time of their coming."

In "Exodus" and "Numbers" are recorded the great flights of quail and we read how the Israelites took great numbers of these birds.

One of the first accurate accounts of migration was written 300 years after Jeremiah, by Aristotle. One of his books shows very clearly that he had made a careful study of bird life and especially of migration. Aristotle records that ravens and crows do not migrate and that turtle

doves and quail remain in sunny spots, but that some birds flee before winter from Pontos on the south shore of the Black Sea, and other cold regions, and in spring go north again before the approach of summer.

Many years after Aristotle, in the year 1251, Matthew Paris is said to have recorded an extraordinary flight of red cross-bills to England. From then on, men and women have continued to study this wonderful miracle of migration and it will still be studied long after we have passed on.

CHAPTER IV

QUESTIONS ON THE MIGRATION OF BIRDS

1. What is the meaning of migration?
2. What is a migrant?
3. Do all birds migrate?
4. When do birds migrate?
5. Why do birds migrate?
6. Which birds migrate by day?
7. Why do they migrate by day?
8. Which birds migrate by night?
9. Why do they migrate by night?
10. How high do migrating birds fly?
11. Do they fly with or against a strong wind?
12. At what speed do migrating birds fly?
13. Do migrating birds follow certain routes?
14. Which migrate the greater distance, the water-birds and shore-birds or the land-birds?
15. Which bird migrates the farthest?
16. Give the winter homes of some of our common birds.
17. Are there many casualties among the night-flying birds?
18. Do birds return year after year to the same locality to nest?
19. Do all birds stay in their nesting region the same length of time?
20. Do migrating birds have leaders?

BUGS? NO, BIRDS



This is a scene on J. S. McLeish's ranch, Lane county, Kans., 300 miles west of Kansas City. McLeish has 2,000 acres of prairie, largely grazing land, but all tillable.

Trees in this section are scarce, and you can travel for miles without seeing one, except in the ranch yards, where they have been planted and kept alive by careful watering and tending.

While I was standing on the front porch of the McLeish home, there arose, from a herd of 18 or 20 cows, a black cloud of cowbirds, thousands of them. The birds had been quietly feeding under the cows, between their feet, and here and there one perched on a cow's back.

Art Penfold



THE LAST MAN



It is clearly within the bounds of probability
that insects could make this world a desert and
destroy the human race. Our hope is in protect-
ing the birds

MIGRATION



The chickadee is a homebody,
never traveling very far

Photo A. A. Allen



The bobolink travels 5,000 miles
to the pampas of Brazil

Photo A. A. Allen

MIGRATION



Photo A. A. Allen

The lesser yellowleg is one of our
greatest travelers

Did you ever see so many birds
on a tree? This picture was
taken at Pinhurst, N. C., dur-
ing the migration period. It is
estimated that more than 1,000
cedar waxwings are here taking
a rest



© Underwood & Underwood

21. In what peculiar formation do geese migrate?
22. Are the leaders punished if anything happens to their charges?
23. Which migrate the farthest, the insect-eating birds or the fruit-, berry-, and seed-eaters?
24. Do birds that are strangers to each other in summer, winter together?
25. Do we know where all our migrating birds spend their winter?
26. Which birds, in migrating, do not leave the United States?
27. In what way do birds prepare for their long flight at migration time?
28. Are there any birds that spend their winters on the water?
29. What interesting sight may be seen on a moonlight night during the migration season?

ANSWERS TO QUESTIONS ON "THE MIGRATION
OF BIRDS"

1. Migration is the periodical change of abode, influenced chiefly by seasonal changes in climate, in which case the migration is regularly periodical. The vernal or spring migration, being in the Northern Hemisphere, northward; the autumnal migration, southward. Many birds, though, are irregular in their migration, generally being prompted by the necessity of finding a good supply of food.
2. A migrant is a bird that periodically changes its abode. It nests in one place and winters in another.

3. Not all birds migrate, although scarcity of food will cause a permanent resident to become more or less migratory.
4. Birds leave their winter homes in the Tropics at a time when insects and vegetable food are increasing, so it is generally believed by bird students that this periodic impulse to migrate has been going on for centuries, and in the spring is actuated by the reproductive instinct and the necessity of securing a home where the young can be reared. In the autumn the birds become restless, their young are raised, family cares are over, and once more the urge of migration, which has been evolved through countless centuries, attacks the birds and a slight change in temperature starts them south.
5. Why birds migrate is not yet clearly understood. It is generally believed and backed by Dr. Alexander Wetmore, the distinguished ornithologist, "That migration has arisen from movements induced by seasonal and climatic changes in certain species until it has become hereditary instinct, a part of the life-cycle of the individual, and now actuated by psychological conditions. The habit of ages has become so well fixed that weather conditions now have little to do with the migration of birds, except to permit them to travel or hold them back."

Dr. J. A. Allen states that the migration of birds was the outcome of the glacial period. Before that time it was warm in the Arctic regions and birds did not migrate. The formation of ice drove the birds southward. As the ice receded in the spring, the birds flew north again

to their old haunts, and this formed that strong migrating instinct which is one of the wonders of bird life. All birds of the same species migrate at the same time.

6. Bold and strong-winged birds such as loons, hawks, cranes, ducks, also swallows, nighthawks and chimney swifts migrate by day.
7. The bold and strong-winged birds are rather fearless and they can go without food much longer than the smaller birds.
8. Practically all the timid and feeble-winged birds like the warblers, flycatchers, sparrows, orioles, thrushes, vireos, tanagers, and shore-birds migrate by night.
9. It is necessary for the smaller birds to seek their food by day and they are not so exposed to danger if they fly at night. Small birds have many enemies, so it would be natural for them to migrate by night. There are exceptions. The hummingbird, the smallest of our birds, migrates by day.
10. It is rather difficult to state exactly the height that birds fly but it is generally believed that at a height of about 3,000 feet. Dr. Wetmore says that some birds of strong flight have been known to reach an altitude of 29,000 feet.
11. At the Wallops Island Bird Sanctuary, Virginia, it was noticed that during migration, birds usually flew against the wind, or across a wind current. Flying with the wind seemed to bother them.
12. There is a great difference of opinion as to the speed of migrating birds. The smaller, or perching birds, generally fly about twenty-five to

thirty-five miles an hour. At times they fly much faster for short distances. Dr. Wetmore states that the greatest speed recorded was that of a common swift of Eurasia, observed from an airplane, to be making seventy miles an hour in normal flight.

13. Migrating birds have definite routes—generally following mountain chains, coast lines and valleys.
14. The water- and shore-birds migrate a greater distance than the land-birds. Nineteen species of shore-birds that breed within the Arctic Circle migrate to South America—six penetrating to Patagonia, 8,000 miles from their breeding places.
15. The greatest traveler among the birds is the Arctic tern, which makes an 11,000 mile journey twice a year from the Arctic to the Antarctic and return.
16. The tree sparrows, juncos, brown creepers, golden-crowned kinglets, bluebirds, robins, grackles, cowbirds, catbirds, and various species of ducks which nest in the northern parts of the United States or in Canada, winter in the northern or middle states. Few, if any, reach the Gulf. Others nesting in Northern United States, such as the chipping, field, Savanna and vesper sparrows, winter in the Gulf states; while more than a hundred species leave this country to winter in Central or South America. The scarlet tanager migrates from Canada to Peru; the bobolinks, purple martins, cliff-swallows, barn-swallows, nighthawks and thrushes winter in Brazil. The nighthawk, spending the summer at Yukon, will

often fly to Argentina, 7,000 miles away, to pass the winter. The yellow-billed cuckoo, upland plover, red-eyed vireo and veery migrate to South America. The black-headed grosbeak, rose-breasted grosbeak and white-crowned sparrow migrate to Mexico and South America. The red-winged blackbird migrates to southern United States and Costa Rico. The Baltimore oriole migrates to Southern Mexico and Columbia.

17. Night migration results in many casualties. The birds fly against towers, high buildings, and light-houses and thousands are killed. During fall migration, several hundred birds have been killed in one night by flying against the City Hall tower in Philadelphia.
18. The ability of birds to maintain directions unfailingly and to return year after year to the same locality from great distances, is due to their great sense of direction, something which we are not able to explain.
19. Some migrating species stay in the nesting region only long enough to mate, nest and rear their young. The Arctic tern arrives in the extreme North (its nesting ground) in June and leaves the latter part of August. They stay about fourteen weeks at the nesting site.
20. Migrating birds have leaders, although not always the same one. These leaders, especially among the geese, are expected to act as special guardians.
21. Geese generally migrate in a wedge-shape formation with a big gander as leader.
22. We can not always interpret bird action, but I

have heard instances from the late Dr. Warren and others, that they have observed the migrant leaders apparently not only being "scolded" but actually attacked when they "fell down on their job" by allowing enemies to approach without warning.

23. The insect-eating birds generally, but not always, migrate farther than the fruit-, and seed-eating birds.
24. Many birds that are strangers to each other in summer, winter together. Different species often migrate together. In South America, the black-poll warblers are winter neighbors of the cliff-swallows.
25. We are learning much about migration but there is still some disputed points. Today we do not know exactly where the chimney swift spends its winter.
26. The robins, bluebirds, ruby-crowned kinglet, shrike, song sparrow, grackles, woodcocks, chipping sparrow, cow blackbird, meadowlark, horned lark, cedar waxwing, and many others including the ducks take short journeys and do not leave the United States.
27. Birds feed up well and put on a good layer of fat before starting on their migration.
28. The web-footed snipe, petrels and the red phalaropes spend their winters on the ocean. They float on the crest of the waves like corks and only come to the shore to nest and rear their young.
29. During migration, if you take a telescope and focus it on the moon, you may be able to see

distinctly the night-flyers as they pass between you and the moon. One of the most thrilling sights I've ever seen was, during a spring migration at Wallops Island, Virginia, when I saw both large and small birds cross the full moon.

CHAPTER V

THE BIRD AS A LOVER

ONE fails to know our feathered friends until he or she has observed their actions towards their mates and young. Birds are great lovers and to see the males trying to win their brides in the spring is a beautiful and inspiring sight. There are some wonderful stories told of foreign birds and their peculiar mating actions, but our own American species furnish us with a deep insight into the character of birds.

The heath hen, now found only on Martha's Vineyard, Massachusetts, and the closely related prairie chicken of the West have a peculiar mating habit. In the early spring, following the first light of dawn, these birds will be seen going through their weird courtship antics. They evidently pick their dancing grounds in advance. They run, jump, bow, toot and cackle until the sun gets high. Their short tails are cocked forward over their backs and their neck feathers point directly forward over their crested heads. Puffing up their feathers, the birds strut back

and forth, dancing off their feet, flapping and turning about in the air.

The sounds that accompany the dancing are unlike any other heard in Nature. This is a medley of vocal notes, squeals, cackling, clucking and laughing sounds.

The heath hen is now practically extinct.

The sandhill crane of the Middle West also has a tribal love dance. These birds hop high in the air and cross and recross each other. As many as 200 have been counted on one dancing ground.

Most of our birds mate as soon as they return to us in the spring. The males display their gift of voice and their plumage to the utmost. Frequently they battle with others of their species to win the affections of a particular bird.

I saw a thrasher strut before a female with his tail trailing on the ground. A screech owl will bow, stretch his wings and make a snapping sound with his bill to attract his choice. A wren, at my home, won his bride by the most continuous singing I have ever heard. The mourning doves are noted as lovers.

Those who have watched the mating of wild ducks at Chincoteague Island, Virginia, say that four or five male ducks will attempt to win one female. They follow her in a compact mass and constantly fight with each other to win her favor.

This lasts for an hour or so, and it is entirely cave-man methods.

The final choice is made by the female and not by the male. Generally she chooses the best plumaged male, which shows what good grooming and good clothes will do.

On this island, the poorly-plumaged males are the last to be mated. After mating, most birds are very affectionate.

Few birds probably remain mated for life. Many birds only mate for the season. Some ornithologists believe many of our small birds choose the same mates year after year, if both survive the winter and the dangers of migration, but this is more or less a guess.

Some believe crows mate for life, but it is doubtful.

Canada geese are generally believed to mate for life and are together winter and summer, but again the question arises, "How can we tell?"

The parrots are a familiar example of true monogamy among birds, and in their native lands whole flocks can be seen flying about in pairs at all seasons. Even when hunted, each bird clings to its mate, so that the birds flock to their fallen comrades. Because of this habit, our only native parrot, the little Carolina Paroquet, has become nearly extinct.

There are some birds always polygamous—

that is, having more than one mate. Such are the wild turkey, the domestic rooster, the cow-bird, and according to some, the boat-tailed grackle.

A bird will show great distress if its mate is killed. A chipping sparrow, nesting outside of my window, lost its mate by a bird-eating cat. This dear little bird flew around for two days, on and off the newly built nest, uttering the most pitiful cries, before it disappeared.

Generally, if one of a mated pair of birds dies, the other will eventually take another mate. There are always many unmated birds flying around.

The male bird shows its affection for his mate by singing to her while she is nesting, by relieving her while nesting, and by bringing her food. This breeding instinct which might be called affection keeps up until the nesting season is over. Then, when migration time draws near, the birds pay little attention to their mates.

The affection of the adults for their young is well-known. Many birds will die in protecting their offspring. When the young birds are helpless, the entire time of the parents is spent in giving them food and comfort. They are sheltered from the cold, the rain and the hot sunshine by either one or the other of the parents. If a young bird is taken from the nest, the parents will follow and they have been known to

feed the young bird which had been captured and caged.

Birds will also feed young birds of other species. The most familiar sight is a chipping sparrow, song sparrow or a vireo feeding a young cowbird, whose egg had been laid among her own by the outcast cowbird.

Mr. Edward H. Parry tells of a wren that fed some young robins, which were near a wren's nest. When its own young were hatched, it confined its attention to them.

In my garden I have seen a young bluebird, with fluttering wings, following and begging for food from a robin. The robin would feed the youngster as if it were its own.

Studying the every-day life of birds is to open a book of wonders.

CHAPTER VI

QUESTIONS ON THE MATING OF BIRDS

1. Are birds ardent lovers?
2. When do birds mate?
3. How does a bird try to win his mate?
4. Do most birds mate for life?
5. Which two birds do mate for life?
6. Which bird is always polygamous?
7. Which birds are known to have a harem, that is, more than one mate?
8. Which shy birds are extremely affectionate?
9. Which birds desert their mates before the nest is even completed?
10. Which birds remain constantly together winter and summer?
11. Are there many unmated birds seen during the season?

ANSWERS TO QUESTIONS ON THE MATING OF BIRDS

1. Birds are very affectionate to their mates and are ardent lovers.
2. Most birds mate just after the spring migration.
3. A bird, in trying to win his mate, will display his great gift of song, fluff and spread his feathers,

strut, coo and will even fight to show his prowess. Some birds have a mating dance.

4. Most birds probably mate for a single season. According to Mr. Baldwin's study in Ohio of the house wrens, it would indicate these birds only mate for a single nesting.
5. The ostrich mates for life. If their mate dies they seldom take another. Some parrots also do the same.
6. The cowbird is always polygamous and bothers little about his mates.
7. The boat-tailed grackles on Wallops Island, Virginia, always seemed to have several mates at the same time. Wild turkeys usually have two or more hens following them around, and the barnyard rooster is noted as a master of a big harem.
8. The mourning doves are very shy, but noted as great lovers.
9. Many game birds are said to be normally polygamous and after mating desert the females without even assisting with the nest. Some of the wild ducks desert their mates as soon as the first egg is laid. The hummingbird, although not polygamous, deserts his mate as soon as the eggs are laid.
10. Some ornithologists believe Canada geese remain constantly together, winter and summer, as long as they live.
11. There must be many unmated birds. They are bachelors or spinsters; or widowers or widows made so by the many accidents that befall bird life.

CHAPTER VII

THE BIRD'S HOME

A BIRD'S home is where it builds its nest and raises its little brood. And what wonderful homes they build!

Each species has its own individual way of building its nests, and they vary as much as the architecture of our different homes. Individuals of the same species rarely vary in nest-building.

The migration of birds fills us with wonder; their gayly colored plumage delights our eyes; their wonderful songs fill our hearts with joy; but oh! how we love them for the wonderful nests they build in our gardens, our orchards, our fields and our woods. Nests, wherever seen, bring a thrill to the finder.

All students of bird life are interested in the subject of birds' nests, and many theories are advanced as to how the birds learned to make their various kinds of nests. Evidently instinct is the only teacher, but this instinct has been slowly developed and handed down by each species throughout the ages. From carefully studying

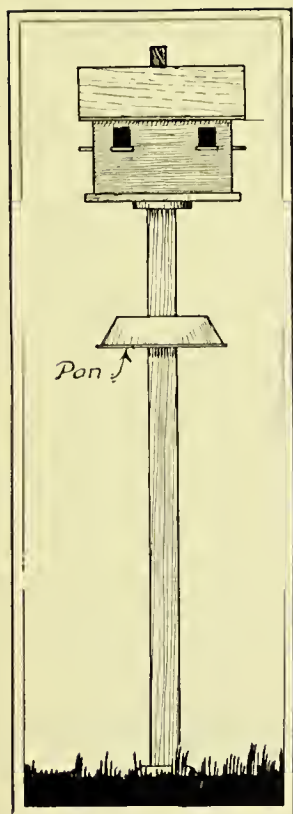
the birds of the past, this nest-building has been a long and gradual growth.

It is generally believed that the birds' ancestors were reptiles. These reptiles left the eggs to be hatched by the heat of the sun, or by the heat developed by decaying vegetation. The fossil remains of a strange creature that lived ages ago, called the *Archaeopteryx*, was discovered in Bavaria in 1861. Careful studies made of this fossil, show that this strange being was the intermediary between reptiles and birds, and no doubt its nesting habits were more like those of a reptile than of the birds of today.

Birds slowly developed beyond the cold-blooded reptilian stage into warm-blooded animals. When this took place, the eggs required constant body heat above that of their surroundings, and it then became necessary for the mother birds to hatch their eggs by heat. This was naturally accomplished by the birds sitting upon them. From this habit of the birds sitting upon them, the egg developed the need of nests to keep them from rolling about and to provide a comfortable place for the bird to sit during the long tedious period of incubation.

Almost all our American birds build nests, but the brush turkeys of New Guinea still do as their reptilian ancestors did and deposit their eggs in

PROTECTING NESTS



Even though your bird-house is set at the top of a pole, some cats will reach it. Clever, bird-destroying cats will climb the pole, get a secure footing at the house, then reach a clawed paw through the hole and remove the young birds. To prevent a cat from climbing the pole, set a pan on it, upside down as shown. Make two cuts through the bottom of the pan in the form of a cross and bend the corners down. Place this over the pole and fasten with tacks through the tin corners

A NOTED MONUMENT



THE MONUMENT AT SALT LAKE
CITY TO THE BIRDS

(See page 23)

A BIRD THAT LAUGHS



This bird is known as a "Laughing Jackass." He lives in Australia, is about as large as a crow, and his clothes are gaily colored

NESTS OF BIRDS



The killdeer makes a little depression in the gravel. This is the simplest type

Photo A. A. Allen



The mother nighthawk lays her two mottled eggs on a roof or on the ground in open fields

Killdeer's nest with one egg and three young



Photo A. A. Allen

NESTS OF BIRDS



The green heron builds in a tree, but the nest is a mere platform of sticks



Photo A. A. Allen

The warbler is more advanced.
The nest is hollowed and of
soft materials

the warm sand and leave them to be hatched by the heat of the sun.

The mound birds of Australia lay their eggs in piles of earth, leaves and vegetation, and the heat of this decaying mass hatches the eggs.

In America, every stage of nest development can be found. Here are five distinct types: First, the whip-poor-will which lays her eggs on the ground, making no attempt at nest-building; second, the killdeer and some terns deposit their eggs in a shallow depression on the ground or seashore, with no lining whatever except a few pebbles, etc.; third, the veery and other birds which raise their nests from the ground and place them on a bed of leaves; fourth, the little warbler's nest is higher up and the nest is hollowed and lined with soft material; fifth, is the last word in nest-building, the wonderful pendant nest of the Baltimore oriole.

Of course there are many other kinds of nests and generally the type of nest depends upon the condition of the young upon hatching.

Birds such as ruffed grouse, quail and many of the duck family, do not make elaborate nests. A shallow depression lined with leaves, hidden beneath a fallen log or under a low bush is all they need. Their young are active as soon as hatched.

A few warblers nest on the ground. The mead-

owlark also builds upon the ground, but her nest is carefully built of grasses and it is partly covered so that it is warm and comfortable. Her young are hatched almost naked, blind and helpless, so a warm nest is demanded.

Some of the birds that nest above the ground, on bushes or trees, construct very poor structures. The cuckoo, mourning dove, and green heron all have flimsy nests. Being in the air, though, protects them from the cold damp ground.

The woodpecker family drill their own nest holes in trees, but all that is left in these holes is a few chips and sometimes none.

The owls do not even drill holes, but use natural cavities.

The bluebirds, chickadees and nuthatches build well-formed nests usually in woodpecker holes or bird-houses.

Hummingbirds, wood pewees and gnat-catchers cover the outside of their nests with lichens from the tree and it makes them almost invisible from the ground.

You will usually find paper in the nest of vireos and wood thrushes.

The warblers build beautiful nests. They are deep, cup-like structures, woven of cotton, plant down and horsehair. An easily recognized nest is that of the Baltimore oriole. This hanging nest

is carefully woven of strings, horsehair and plant fibers, carefully concealed among the leaves and suspended from a branch.

Some birds dig their nests in banks or cliffs, such as the bank swallows and kingfishers. The kingfisher frequently burrows three feet or more into a sandbank. No materials are taken into this cavity.

The nest of the swift, made of sticks glued against the inside of a chimney, is an interesting type.

Our cowbird evidently has lost its nest-building instincts, as she deposits her eggs in other birds' nests.

Sometimes both male and female assist in building the nest; at other times only the female builds, while the male sits nearby and sings to her.

A crested flycatcher's nest, I watched, was built entirely by the female. It took her ten days to finish it and it was made of dry grass and horsehair. It contained a piece of snakeskin about eight inches long. The five eggs all hatched and the young were fed large flies, small butterflies, moths, caterpillars, grasshoppers and many small winged-insects. While both parents fed the young, the female brought twice as much as the male. The young of the flycatchers left the nest fifteen days after hatching.

The young of this flycatcher fly strong and direct from the nest, while the robin and blue-bird fly in a wavering and weak manner.

All nests are interesting and well worth our study. Here is a good plan to use in studying the nest: 1, Name of bird. 2, When the mating began. 3, Actions during courtship. 4, When nest-building started. 5, Whether male or female or both did the building. 6, Site of the nest. 7, Materials used. 8, When the nest was completed. 9, How the birds acted during nest-building. 10, When first egg was laid. 11, Number of eggs laid. 12, Color of eggs. 13, When last egg was laid. 14, Whether male or female or both incubated the eggs. 15, Actions during incubation. 16, When first bird was hatched.

Here is a report filled out and you can see how interesting it is: 1, Robin. 2, April 15th. 3, Flights, pursuit and song. 4, April 22d. 5, Both. 6, Fork of locust tree, ten feet above ground. 7, Coarse grasses, bits of string and rags and twigs, walled with mud and lined with finer grasses. 8, April 27th. 9, Birds worked during early morning, male devoted to female. 10, April 29th. 11, Four eggs. 12, Blue. 13, May 2d. 14, Both. 15, Male fed female on nest and sang in tree nearby. 16, May 10.

Here is what Mrs. A. A. Crawford, Califor-

nia, writes of a nest she examined. "The foundation was built of twigs and roots, intermingled with different kinds, sizes and lengths of string. Then came newspapers and feathers; then softer twine, followed up with a very thick layer of horsehair, around and around the inside of the nest; next a woven soft mesh of human hair, so golden, fluffy and fine that it must have come from some little child's head; finally, inside of this, was a coating of the finest of lint. By careful measurement, there were 500 feet of hair, fifty-eight feet of string, five feet of thread, thirty-eight feet of roots, fifty-five feet of shredded stuff and fine lint."

GIVE THE BIRDS NESTING MATERIAL

Birds are very anxious to secure suitable nesting material, and by putting out a variety you may attract many birds to your grounds. Some string had been placed in a convenient spot by a Canadian friend. One morning a bullock oriole took fifty strings to use in weaving her nest. Dog's hair was also put out, and she carried great mouthfuls of it to line her nest. This nest was in a cottonwood tree, twenty feet above the ground, and was built entirely by the female.

Materials that are appreciated by the birds are

string (from six inches to a foot in length) cotton, wool, yarn, hair, silk, excelsior, feathers, down, etc.

To show how badly birds need nesting material, a friend wrote me that the robins took the strings and labels from around the plants and wove them into their nests. Another bird lover put out red, white and blue yarns, cut in six-inch lengths, and almost every nest in that vicinity had some of these colors in it. I hope that all will place some good nesting materials where the birds can find it. As the robins, phoebes and swallows all use mud, pans of soft mud should be put out for them if the season is dry.

S. T. Walker (a bird lover of Oregon) described how he helped the birds each spring.

"As soon as the violet-green swallows come in the spring, we play with them by "floating feathers."

"You need a nice lot of soft fluffy feathers that are clean and dry. Take these feathers and go up on the roof or any high place where the feathers will have a chance to float before landing. Then drop them one by one and the swallows will have great sport in catching them. They seem to prefer getting their nesting material from the air rather than from the ground.

"When the nest-building is not too urgent, they will fly high in the air and drop the feather and

catch it again; or perhaps another swallow will catch it and take it to the nest.

“When they are taking them freely from the air, take a stick six or eight feet long with a notch in the end to hold the feather. After waving it gently back and forth, if they do not take it, release it with a quick jerk. If you are patient they will take it from the stick, and by lowering the stick they will take feathers held in the hand.

“Another way is to hold a feather in the hand and blow it into the air. They will soon learn to catch in nearer and nearer to the hand, and if very eager, will catch it before it leaves the hand. If there is not a telephone or some wire within six or ten feet of the ground, it will pay to stretch one; for contrary to what is said in most books, the swallows spend a great deal of time resting on the wire. When they are there resting, put a feather on the stick, and while talking to them gradually approach, holding the feather toward a swallow. Soon it will allow you to bring the feather close to its bill and may take it from the stick and carry it to its nest or drop it to the ground.

“After a while the swallow will let you gently rub its back or head with the feather. In one instance we got one female so tame she would sit on our hands or light on our heads to get a feather stuck in the hair. In fact, she would sit

on our hands and pick up grains of slaked lime and sand; and sometimes it seemed as if she sat there just to show us she was not afraid. Of course in all this there must be no quick motions, and many of the movements must be so slow as to be almost imperceptible.

"We have found air-slaked lime and hardwood ashes a drawing card. This may be more especially true in this country which is deficient in lime in the soil. The cliff-swallow, violet-green swallow and tree-swallow all eat lime.

"The Bullock orioles have learned to look to us for a supply of nesting material in the way of strings of various colors, horsehairs, wool, etc.

"One fact that we have noticed is that their nests are almost without fail placed on the north-west sides of trees and, for the last two years, over a road that has more or less travel. The nests are so low that a person on top of an average load of hay could look into them."

Gilbert Grosvenor, Editor of the *Geographic Magazine*, has a record of fifty-nine bird-nests to the acre at his home at Wild Acres, Maryland.

He wrote me, "We did everything we could for the comfort of our birds. For instance, we put on twigs, little pieces of oil-paper in which our butter came wrapped, and we left mud in convenient places for the martins. The catbirds used the oil-paper for their nests—in fact, they used

all kinds of scraps. Imagine the delight of the family when, on examining one of the catbird's nests in the autumn, we found one of the children's hair-ribbons, and also a piece of an old dress of the baby!"

QUEER NESTING PLACES

I have found my feathered friends nesting in many peculiar places. My friends also frequently have found nests in odd places, and from the observations of my friends and myself, the following list is made:

A purple grackle built her nest on an urn-shaped ornament on a church spire, 180 feet above the pavement.

While camping out in the woods, I made a bracket for my frying pans. Later, I found wrens were building in both pans.

A pair of robins built in the driver's seat of a binder which was in an open shed.

A dove built its nest on the flat rail of an old stile.

My neighbor hung a coat on a clothes-line. Later in the evening when he went to remove it, he found a wren's nest in one of the pockets. During the day, the wren had carried sticks, wires, a belt buckle and other materials, making a complete nest.

Last year a bird built its nest in our mail-box. I cleaned it out several times, but each time the bird would start to build again, so I fastened a rough box alongside of the mail-box. The bird then nested in this box and raised its little family of five young birds. This year the bird did exactly the same thing, so I again put up a box and it built in the box alongside of the mail-box.

WHERE BIRDS BUILD

Birds do not always build their nests in the same locations. Today, forty-five species of birds have been known to build in bird-houses, or on supporting devices built for them. Here is a list of nesting places compiled from accurate studies.

Bob-white; pasture field, on ground. House wren; bird-house, six feet. Great horned owl; hollow oak tree, fifteen feet. Redstart; wild cherry tree, seven feet. Catbird; lilac bush on lawn, six feet. Brown thrasher; green briar near woods, five feet. Scarlet tanager; oak tree, fifteen feet. Orchard oriole; pear tree, twenty feet. Goldfinch; balsam-fir, fifteen feet. Baltimore oriole; black walnut, twenty-five feet. Bluebird; apple tree, five feet. Phoebe; shelter shelf, seven feet. White-breasted nuthatch; apple tree, seven feet. Kingbird; open bird-house, eight feet. Robin; open bird-house in apple tree, twelve feet.

Mourning dove; maple tree, twelve feet. Screech owl; deserted woodpecker's hole, fifteen feet. Blue jay; cedar tree, twelve feet. Crow; fir tree, thirty feet. Great crested flycatcher; bird-house, ten feet. Song-sparrow; open bird-house in apple tree, eight feet. Hummingbird; trumpet-vine against house, eight feet. Martin; bird-house on lawn, twelve feet. Chickadee; pear tree, nine feet. Flicker; bird-house in fir tree, eighteen feet. Meadowlark; meadow, on ground. Tree swallow; bird-house on telephone pole, twelve feet. Barn swallow; porch support, nine feet. Chipping sparrow; low bush, two feet. Bank swallow; sandbank, eighteen feet. Kingfisher; bank, three feet. Green heron; myrtle bush, eight feet. Night-hawk; top of gravel roof in city. Barn owl; bell-fry of church. Marsh hawk; on ground in high marsh. American bittern; fresh-water marsh. Chimney swift; loft of old frame building, against board. Red-winged blackbird; tussock of grass in meadow. Clapper rail; rank grass along salt-water creek. Long-billed marsh wren; in reeds, salt-water marsh. Laughing gull; on high, sandy beach near ocean. Least tern; on high, sandy beach near ocean. Common tern; on high, sandy beach near ocean. Fish hawk; dead tree, edge of cornfield (for twenty years). Duck hawk; under shelving rock. Sparrow hawk; dead tree, sixty feet.

CHAPTER VIII

QUESTIONS ON THE NESTING OF BIRDS

1. When do birds nest?
2. Why is food an important factor?
3. What does a bird seek in securing a site for a nest?
4. Name some birds that nest in trees.
5. Name some birds that nest in holes in trees.
6. Name some birds that nest in banks.
7. Name some birds that nest on the ground.
8. Name some birds that nest on low bushes or reeds.
9. Name some birds that nest in bird-houses.
10. Name some birds that nest against buildings and in barns.
11. Are there many different kinds of nests?
12. What influences the character of the nest?
13. Which kind of bird always nests alone?
14. Which birds nest in colonies?
15. Which birds weave their nests?
16. Which birds mold their nests?
17. Which birds act as carpenters in building their nests?
18. How long does it take a bird to build its nest?
19. Do birds use the same nest more than once in a season?
20. Which birds use the same nest year after year?
21. Does the male or female bird build the nest?
22. Which birds always use mud in building their nests?
23. With what does the chipping sparrow line her nest?

24. What bird is noted for being an indifferent builder?
25. What materials are used in nest-building?
26. Which bird nests very early?
27. Which birds nest in March?
28. What familiar birds nest in April?
29. Which months are known as the great nesting months?
30. Which birds rear a second brood in June?
31. Which bird sometimes raises a third brood in August?
32. Which birds frequently use telegraph and telephone poles for homes?
33. Which bird builds its nest on a raft?
34. Are our birds sanitary in regards to their nests?
35. Where is this excrement dropped?
36. What are the birds very careful to do while the young are in the nest?
37. Should the nests of birds be visited?
38. Which birds make much fuss and scold when their nests are discovered?
39. Which birds feign lameness and try to lead you away from their nests?
40. Which bird usually places snake skin in its nest?
41. Which bird locks his mate in her nest while she is sitting?
42. Which noisy bird always brings food to its mate while she is nesting?
43. Which bird, often called the "policeman of the woods" watches the nest while his mate is hunting food?
44. What familiar bird always gets into the nest and covers the eggs while his mate is away?
45. Which brilliant bird calls to his mate and they both fly off for food leaving the nest unprotected?

46. What do most male birds do while their mate is nesting?
47. Name some special materials found in certain birds' nests.
48. Describe some forms of nests peculiar to different birds.
49. Which birds are seen in flocks when not nesting?
50. Which bird usually arrives first at the nesting grounds?
51. Does the male or female select the nesting site?

ANSWERS TO QUESTIONS ON THE NESTING OF BIRDS

1. Birds usually nest at the time of the year when there is plenty of food. It is periodic and annual. Migratory birds nest when they reach their summer homes.
2. The old birds can travel far for their food supply, but the young of most species must be fed in the nest; and, as they are voracious eaters, the food supply must not only be easy of access, but it must be unlimited.
3. A good hiding place is demanded by most birds for their nests. There are some birds though, that do not seem to follow this general principle. Sea-birds, such as the terns, lay their eggs on the shores or cliffs, with no apparent concealment. Most gulls make good nests on the marshes. These nests, though, are hard to find on account of the color of the eggs matching the play of light and shade on the sand and stones. Other sea-birds lay their eggs without concealment but in inaccessible places.

4. Orioles, flycatchers, scarlet tanagers and many others nest in trees.
5. The woodpecker family, the nuthatches and some owls nest in holes in trees.
6. The belted kingfishers and bank swallows dig holes in banks or cliffs for their nests.
7. The meadowlark, night hawk, sea- and shore-birds, and many other species build their nests on the ground.
8. Red-winged blackbirds, long-billed marsh wrens and some others build on low bushes or reeds.
9. Forty-five species of birds have been known to build their nests in bird-houses. The list is given elsewhere.
10. Barn swallows and phoebes build their nests against buildings and in barns.
11. Almost every species of bird builds a different kind of nest. Some are crudely built, others are elaborate. Some birds use the deserted nests of other species.
12. The influences that determine the character of nest-building are: 1, Protection desired. 2, Condition of young at birth. 3, Temperament of the bird. 4, Structure of the bird. 5, Habit of feeding and instinct. 6, Change of habit caused by changed conditions.
13. The hawk family, very unsociable birds, always nest alone.
14. The happy and cheerful martins and swallows nest in colonies.
15. The Baltimore oriole makes a nest that is beautifully woven into a long flexible pouch.
16. The cliff swallow makes a gourd-shaped nest, open

at the top, entirely molded of mud pellets, and lined with feathers.

17. Woodpeckers act as carpenters in chiseling out their nests.
18. In nest-building, some birds do it leisurely, as if they found pleasure in prolonging the task. Phoebe, for instance, come back in March, and although they do not begin to incubate until the latter part of April, they are busy every warm, sunny day carrying material with which to renovate the old nest under the eaves or on some rocky ledge. Other birds allow only a few days for building, and then work indefatigably until the home is complete. Some birds build their nests in less than a week, other take two weeks, and it is said the South American oven bird takes three months to complete its nest.
19. Some birds use their nest the second time and others do not. Phoebe use the old nest and make additions to it. Bluebirds generally use the same house, but we have known them to desert it for another. Song sparrows practically always build a new nest. Wrens use the same one, but it has been observed that the majority of tree-nesting birds build a new nest for the second brood. Most birds making cup-shaped nests make a new one for the second brood no matter how well the first one is made.
20. Eagles, owls and fish hawks repair their homes and use them year after year. Woodpeckers sometimes nest in their old nesting places.
21. Sometimes both sexes build the nest, at other times one will collect the material and the other one builds. In some cases the female only builds the

NESTS OF BIRDS



This wonderful picture of an osprey and its nest, was photographed by my good friend, A. L. Meyer, New Jersey

NESTS OF BIRDS



The right way to collect birds—an American goldfinch on her nest. Photo by Beecher Berry of Ohio



A chestnut-sided warbler on her beautiful nest

Photo A. A. Allen

NESTS OF BIRDS



Photo A. A. Allen

The last word in nest building—the pendant nest of the Baltimore oriole

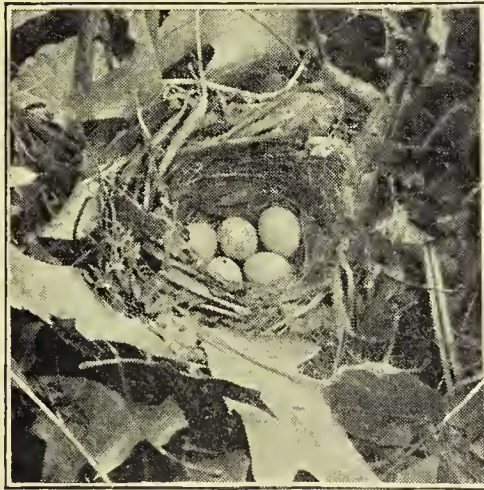


Photo A. A. Allen

The veery raises her nest from the ground and places it on a bed of leaves

A SMALL NEST AND A LARGE HOUSE



All my life I have studied birds, yet I have never found a humming-bird's nest. The nest shown was found and photographed by Delphia Phillips of California.

The humming-bird is very tiny and her nest looks like part of the limb on which it is fastened. The nest is made almost invisible, as the bird uses pieces of the bark to cover it.

At Buck Hill Falls, Pa., humming-birds have been attracted to bushes, right up against the porch, by filling small vials with sweetened water or honey and covering them with red flannel.

Martins are among our most beneficial birds, as their food consists almost entirely of insect pests. Here is a good home-made martin house built by C. A. Bubbs, one of our Ohio bird-lovers.



nest while her mate will sit nearby and encourage her by singing his sweetest.

22. Robins, barn and cliff swallows use mud in building their nests.
23. A chipping sparrow always lines her nest with horsehair.
24. Mourning doves are such careless builders that storms frequently destroy their nests.
25. The following materials are used in nest-building: leaves, lichens, twigs, grass, moss, bark, clay, mud, fur, feathers, hair, paper, rags, wool, yarn, string, etc. Some birds, through their salivary glands, emit a kind of glue which is used in constructing their nests.
26. The great horned owl begins nesting late in February or early in March.
27. The barred owl, and the duck hawk nest in March.
28. In April, the robin, bluebird, phoebe, song sparrow, mourning dove, purple grackle, crow, white-breasted nuthatch and some of the hawks and owls are nesting.
29. May and June are noted as the great nesting months. In June every bird seen either has a nest, or has had a nest in that vicinity.
30. The robins, song sparrows, phoebes, and bluebirds rear their second brood in June.
31. Song sparrows frequently rear a third brood in August.
32. Woodpeckers frequently chisel out their homes in telegraph or telephone poles.
33. The grebe cuts off the green stems of water plants, binds them together, places vegetation on top and uses this floating raft for a nest.
34. Our birds attend very carefully to the sanitation of

their nests. They quickly remove the excrement of the young. This is enclosed in a membrane so it is easily carried in the bird's bill.

35. The excrement from the nest is carried some distance away. Sometimes it is eaten by the parents. If dropped near the nest, it would attract the notice of bird enemies.
36. When the young are in the nest, the parents not only feed them, but are careful to shade them from the hot rays of the sun and from heavy rainfalls.
37. It is a great mistake for a number of persons, one after another, to visit a nest that has been discovered. Frequently such visitors have actually driven the birds to desert their nest and eggs. A bird is very observing and it takes little trespassing on the bird's territory to make it suspicious. Again, dogs or cats follow persons and they later often destroy the eggs and nests of ground-nesting birds.
38. The robins, chipping sparrows, mockingbirds, red-winged blackbirds, and chickadees will make much noise and summon the other birds if their nests are in danger.
39. Many birds, such as the grouse, woodcock, killdeer, nighthawk, mourning dove, sandpiper and others will, on having their nests discovered, feign lameness and try to get you to follow them so as to get you away from the eggs or young.
40. The great crested flycatcher often carries the discarded skin of a snake to its nest. They use snake skins, just as chippies use horse hair, robins, mud, etc. We can't explain the choice.
41. The hornbill of Africa never trusts his mate while

she is nesting. With mud, he daubs up the entrance to the hollow in the tree where she is sitting, leaving only a small hole. Through this hole, he supplies her with food until the eggs are hatched.

42. The blue jay always brings food to his mate while she is nesting.
43. The kingbird will sit near the nest and guard it while his mate is seeking food.
44. The redstart, as well as many other birds, will get on the nest and keep the eggs warm, as soon as his mate leaves the nest.
45. The goldfinch will call his mate until she leaves her eggs or nestlings and follows him in search for food, leaving the nest unprotected.
46. Most male birds perch on a tree near the nest and sing their sweetest while their mates are nesting. The singing tree is usually not the one containing the nest.
47. The great-crowned flycatcher usually has the cast-off skin of a snake in her nest. You will find mud in the robin's nest and spider webs will often be found in a vireo's nest. In a chipping sparrow's nest you will find horse hair and in a chickadee's fur or feathers. The tree swallows at Wallops Island always use tern feathers with which to line their nests.
48. The robin's nest is cup-shaped; the ovenbird's is dome-shaped or like a Dutch oven with opening on one side; the vireo's nest is basket-shaped; the swift's is wall-pocket-shaped; the cliff swallow's retort-shaped; the oriole's like a deep pocket with a small opening at the top.
49. When not nesting, the following birds are usually

found in flocks: Bobolinks, bluebirds, blue jays, blackbirds, cedar waxwings, crossbills, chimney-swifts, crows, goldfinches, grouse, juncos, purple finches, night hawks, swallows, tree and other sparrows, and warblers.

50. The males usually arrive first on the nesting grounds, and make ready for the females by driving away rival males from the areas which they have selected for their own.
51. The females seem to decide on the actual nesting site, and when this great matter is settled, both birds, in many cases, set about building.

CHAPTER IX

EGGS—BIG AND LITTLE

IT is not surprising that for centuries, men have collected birds' eggs, for by the great variance in size and color they appeal to the curiosity and artistic taste of man.

These beautiful, delicately fashioned marvels of Nature were taken and cherished, not only by boys and girls, but by adults. Little by little we came to realize that birds were of great value to agriculture, that they were a great inspiration to wholesome out-door life, and that therefore their nests should not be plundered. Today, there is an army strongly enlisted in bird protection, and public sentiment protects the birds' homes even more effectively than do fines imposed by laws.

Ostrich eggs are enormous. They are about five or six inches in diameter. A ruby-throated hummingbird's egg is the size of a small bean. There are all kinds and all shapes in between these two extremes.

Did you ever realize just what a wonderful

thing an egg is? In the female bird's ovary is a minute cell. This remains in the ovary until it accumulates a yolk, which is nothing more nor less than food to support the unhatched chick. When the yolk has reached its full size, it, with this cell, passes out of the ovary into the oviduct and here the white, or albumen, which is more food, is added. In the lower part of this oviduct the protecting shell is added and last of all, the color and markings.

After the egg is laid, another marvel occurs. By incubation, that is by the application of heat, this minute cell gradually turns into a bird. In the egg of the tiny hummingbird, it takes about twelve days; but the egg of an ostrich takes about forty days to hatch.

Birds are not the only creatures that lay eggs. Most reptiles lay eggs, and insects lay eggs. The eggs of reptiles are covered with a leathery, or parchment-like covering and are never colored. Birds' eggs need incubation, reptile eggs do not.

Many birds' eggs were formerly used for food. Today, we systematically rob the hen's nest, but always have a nest egg, and by careful breeding have succeeded in getting a hen to lay 351 eggs in one year.

Eggs of the clapper rail were formerly sold in many markets, and in some parts of the world

at the present time, eggs of our sea-birds are used for food.

The number of eggs laid by birds vary. Such birds as the murre and other sea-birds lay but one egg. The turkey vultures, hummingbirds, mourning doves and night hawks lay two. Our robins, bluebirds, thrushes, etc., lay three to five. Wild ducks, turkeys and grouse generally lay about a dozen, while a quail will frequently lay eighteen eggs. Eggs laid in dark holes are usually white, while those laid in exposed places are often colored very much like their surroundings. It is hard to find the eggs of the killdeer and night hawk, so closely do they resemble their surroundings.

There are many types of egg shapes. House wren's is ovate; hummingbird's is elliptical; crested flycatcher, elliptical-ovate; owls almost spherical; cedar waxwing, elongate-ovate; sand-piper, pyriform.

The colors run from the purest white and plain blue to those that are spotted, wreathed, speckled, blotched, streaked, washed, mottled, marbled, and scrawled with color of one kind or another. Eggs are usually laid in the early morning.

Today, the best way to have a collection of birds' eggs is by photographing the nest, and the way to do that is explained elsewhere.

SAMPLE REPORTS ON MATING, NEST-BUILDING AND
EGG LAYING*Bluebird*

1. Mated April 10th. Courtship by song and calls.
2. Nest-building by both began April 12th.
3. Nest in apple tree, five feet above ground.
4. Nest of wisps of hay and straw lined with feathers.
5. Nest completed April 20th.
6. April 25th, four bluish-white eggs in nest.

Phoebe

1. Mated April 20th. Courtship, aerial flights by male.
2. Nest-building by both began April 23rd.
3. Nest on shelter shelf, eight feet above ground.
4. Nest of mud, grasses and moss.
5. Nest completed April 27th.
6. May 2nd, four white eggs in nest.

White-breasted Nuthatch

1. Mated April 15th. Courtship by song.
2. Nest-building by both began April 19th.
3. Nest in hollow of apple tree. Female very shy; male devoted.
4. In bottom of nest, feathers, fur, bark and leaves.
5. Nest completed April 25th.
6. Five eggs in nest, creamy white, thickly spotted with brown.

CHAPTER X

QUESTIONS ON THE BIRD'S EGGS

1. How does a bird's life begin?
2. Describe the formation of an egg.
3. Are insects' eggs like birds' eggs?
4. What other eggs do birds' eggs resemble?
5. In what way do birds' eggs differ from eggs of reptiles?
6. What are egg shells composed of?
7. Are birds' eggs all the same size?
8. Do birds' eggs differ in color?
9. What causes the colors of eggs?
10. What is a "clutch"?
11. Does the number in a clutch vary?
12. How soon after the nest is completed do the birds start laying?
13. If an egg is stolen from the nest, will the bird replace it?
14. Give a noted example of long-continued laying, when the eggs are continually taken away.
15. Does the condition of the young at birth influence the size of the egg?
16. How is it that there is such a marked difference in the size of the eggs of the catbird and spotted sandpiper, when the birds are practically the same size?
17. Which birds lay their eggs in the nests of other species and never bother with their offspring?

18. What is generally considered the reason some birds only lay one egg, while others lay many eggs?
19. How many eggs do the turkey buzzard, mourning dove, night hawk, and whip-poor-will lay?
20. What is the color of most eggs laid in dark places, such as laid by the kingfisher, chimney swift and woodpecker?
21. What is the color of the eggs laid on the ground by birds such as the night hawk, killdeer and sandpiper?
22. Which birds lay eggs shaped so that they can not be blown away?
23. Where do wood ducks lay their eggs?
24. Which bird covers her eggs with feathers before leaving the nest?
25. Why does the wood duck cover her eggs when she leaves the nest?
26. What influences the period of incubation?
27. How long does it take an egg of the perching birds, such as the bluebird, to hatch?
28. How long does it take to hatch the domestic hen's egg? a duck's egg? a guinea's egg? a pigeon's egg?
29. How long does it take to hatch the egg of an ostrich?
30. How long does it take to hatch a hawk's egg?
31. How long does it take to hatch the eggs of the emu of Australia?
32. Which bird incubates the eggs—the male or female?
33. Which male bird usually incubates the eggs?
34. Which male bird not only incubates the eggs, but cares for the young?
35. What is the best way to have an egg collection?

36. What is very important in photographing the nests of birds?

ANSWERS TO QUESTIONS ON THE BIRD'S EGGS.

1. A bird's life, like any other life, begins with a single cell.
2. Every egg contains one minute cell which is a very small part of the egg. This germinal cell, from which develops the young bird, resides in the female bird's ovary. It remains there until it gathers the yolk which is the food for the unhatched, but growing bird. When this yolk reaches its full size, it, with the cell, passes out of the ovary into the oviduct, in the upper part of which the white, or albumen (also food) is added. In the lower part of the oviduct, the shell is formed and last of all comes color and markings, shortly before the egg is laid.
3. All eggs, even the tiniest insect eggs, are alike, but the birds' eggs are more highly developed.
4. Birds' eggs resemble reptile eggs. You know the bird has reptile-like ancestors in ages long gone by.
5. Birds' eggs have shells. Reptiles' eggs are covered with a leathery or parchment-like covering, although many turtle, crocodile and alligator eggs have shells. Birds' eggs may be white or of many colors. Reptile eggs are always white. Birds' eggs require incubation in order for them to develop. Reptile eggs do not require incubation.
6. An egg shell is composed of carbonate of lime, which is deposited in layers.

7. The size of eggs vary from the tiny egg of a hummingbird, to the immense one of the ostrich.
8. There are white, blue, green, brown, and eggs of many colors spotted or scrawled with many other colors.
9. The color of eggs is due to pigments deposited by ducts while the egg is in the oviduct.
10. A "clutch" is the number of eggs composing a full set.
11. A set, or "clutch" varies from one to twenty.
12. Generally the female starts laying as soon as the nest is completed.
13. Sometimes a bird will replace an egg stolen from her nest, but that is not usual.
14. The domestic fowl will keep on laying for months, before she insists on sitting.
15. The eggs of birds whose young are born with a covering of down, and which can walk or swim at birth, such as the chicken, duck and clapper rail, are larger than the birds whose young are very feeble at birth, such as the bluebird, wren and robin.
16. The great difference in size of the eggs of the catbird and spotted sandpiper is due to the fact that the young of the catbird is a weak, tiny, helpless bit of bird, while the young of the sandpiper is a bright, active, ball of down, ready to leave the nest as soon as hatched.
17. The cowbirds of North and South America and the European, Asiatic and African cuckoos build no nests, but lay their eggs in the nests of other species and let the foster parents incubate the eggs and raise their young.
18. The difference in the number of eggs laid by the

different species of birds is attributed to a wise action of Mother Nature, who is ever kind in looking after her children. The auks, gannets and murrens lay but one egg. The tiny hummingbird lays but two, but the quail and duck family, nesting on the ground, lay from twelve to twenty eggs as their young are subject to much danger and rarely are the entire broods raised.

19. The turkey buzzard, mourning dove, night hawk, and whip-poor-will each lays two eggs.
20. Eggs laid in dark places, such as those of the kingfisher, chimney swift and woodpecker are white.
21. The eggs of the night hawk, killdeer, sandpiper and of most birds that nest on the ground are usually mottled in color and look very much like their surroundings. This makes them almost invisible and is their protection.
22. The eggs of the murrens and auks are very large at one end and taper sharply toward the smaller end. If the wind strikes them, the egg simply revolves. This shows the wisdom of Nature as the eggs are laid on shelving cliffs with no protection.
23. Wood ducks, on Chincoteague Island, Virginia, nest in houses about three feet above the ground, with a runway up to the house. Others lay in holes in trees growing alongside of the water and from three to twenty feet above the ground.
24. The wood duck covers her eggs with feathers before leaving the nest.
25. The wood duck covers her eggs because it keeps them warm during her absence, and this covering also protects them from the prying eyes of robber birds and other enemies.

26. The period of incubation usually depends upon the size of the egg.
27. The bluebird's egg and all those of the other perching birds, hatch in about twelve days.
28. The domestic hen's egg hatches in about twenty-one days. A pigeon's egg in seventeen days; a duck's egg in twenty-eight days; and geese and guinea eggs in thirty days.
29. An ostrich egg hatches in from forty to forty-five days.
30. Hawks' eggs hatch in about eighteen days.
31. The eggs of the Emu, an Australian bird, take about ten weeks to hatch.
32. The different species vary in regard to incubating the eggs. Among some species, both sexes incubate the egg, in others the female, except when she is feeding, then the male takes her place. In a few cases, only the female sits on the eggs.
33. The male ostrich generally attends to the incubation of the eggs.
34. The phalaropes, which are shore-birds, have a peculiar home life. The female lays the eggs, then the male not only incubates them, but cares for the young.
35. The best way to have an egg collection is to use a camera and photograph the nest. In this way, you have not only a picture of the eggs, but also the nest and its surroundings.
36. It is very important in photographing the eggs and nests of birds that the photographing be done after all the eggs are laid and the incubating has begun. If disturbed before the bird begins to incubate, she may desert the nest. Never touch the nest or eggs. Do not cut the

vegetation away from the nest, but carefully hold it to one side. If care is used, the bird will return to her nest and it is possible that you may later be able to get a photograph of the bird on the nest and possibly of the nestlings.

CHAPTER XI

THE YOUNG BIRDS

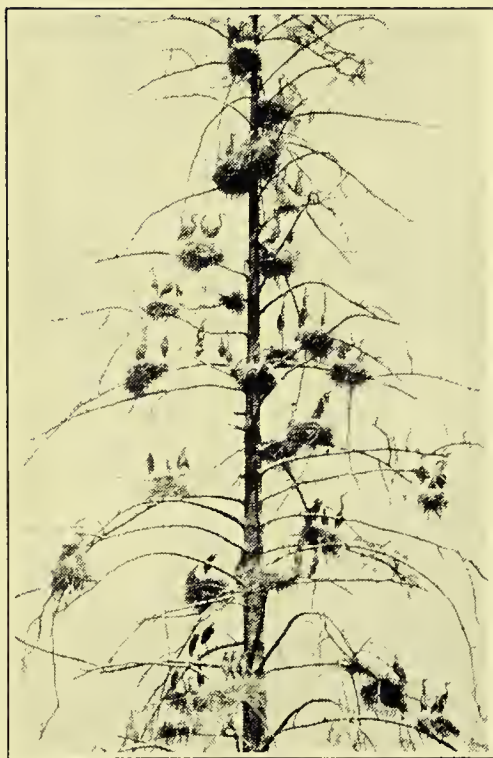
IF you can't enthuse over young birds, you are hopeless as a bird lover. There are so many styles in young birds that you can pay your money and take your choice.

A young ostrich just out of its shell weighs three pounds. It is as large as a pullet, and is yellowish and active. A young hummingbird just out of its shell is the size of a honey-bee, entirely naked and helpless. A young robin is also naked and helpless and is not much larger than the shell it just broke, with what is known as an "egg tooth." This is a sort of hard knob or "tooth" that grows on the end of the beak and is later absorbed.

A young bird may be in its shell for twelve days, like most of our perching birds, but if it is an ostrich it may take forty or more days to hatch.

Ducks, geese, chickens, quail and other birds that live on the ground, as well as hawks and owls, are hatched, dressed in suits of down. They are not naked like the birds hatched in nests in

BIRDS' NESTS



REMARKABLE HERONRY

In this tree are 27 heron nests and 87 young herons. And the tree, a giant hemlock, is close to a highway where a million cars pass yearly. Now, who says birds are shy?

This tree is in Stanley Park (which is a bird sanctuary), Vancouver, B. C. Donald Gilligham, a young ornithologist, climbed a neighboring tree at great risk and took this photo.

No nest is directly above another. *F. D.*

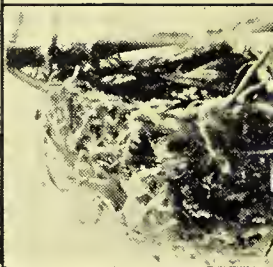
NESTS OF BIRDS



Pewee's nest



Red-winged blackbird's nest



Red-eyed vireo's nest



Dead yellow warbler on her nest. After she had finished the under nest a cowbird came along and put her eggs in that. The warbler then built a second nest over the cowbird's eggs and put her own eggs in it; but the worry must have been too much, for she was found dead on her eggs, as is shown in this picture

THE EAGLES' NEST



© Underwood & Underwood

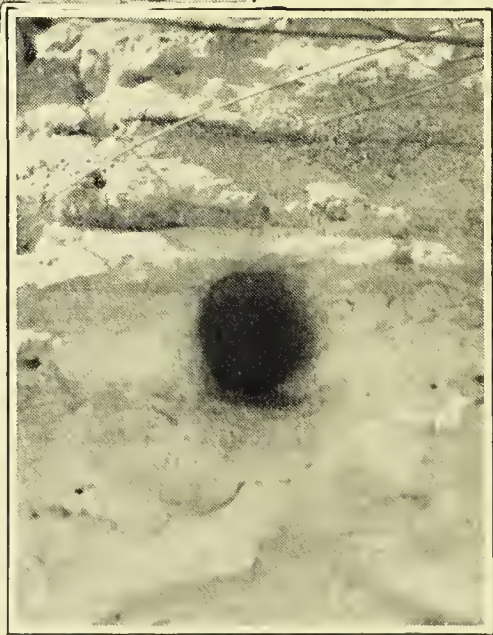
Two young American eagles almost ready to fly from their nest at Mt. Desert, Me. The parent birds use the same nest year after year. It looks like it!

NESTS OF BIRDS



The bank swallows, the smallest of the American swallow family, build their nests far back in the interior of sand-hills. These birds winter in the South, but in the summer are to be found in the northern sections of the country, along the seacoast and inland where sandy sections exists.

The nest proper is constructed of bits of straw, feathers, etc., and is located several feet back from the entrance. The nest is always higher than the exposed entrance hole, both for drainage purposes and to facilitate the initial labor of removing the sand from the desired tunnel during construction.



A close-up of the bank swallow's nest

trees and bushes, such as the bluebird, vireo, catbird and others of our perching birds.

The young ducks, geese, grouse, plovers, sandpipers, chickens and quail can run around almost as soon as hatched. Young quail sometimes run with a part of the shell on their back.

The young of our perching birds are helpless atoms and lie flat down in their nests apparently asleep until they hear their parents, then they feebly cry for food.

To keep them warm the mother sits on them for the first few days and only leaves them when she must get food for her young and herself. Sometimes the father brings the food for the first few days, but not always.

The dainty male hummingbird never comes near the nest after eggs are laid and it remains for the little mother to feed her young. Young birds are hungry all the time and it keeps the parents busy from morn to night to see that their little mouths are kept filled.

Young birds soon begin to become clothed in pretty suits, but they are usually entirely different in color from their parents. We call the first suit the nestling plumage. After the feathers grow, the little birds are ready to leave the nest and then the danger period is increased a hundredfold, for cats and other enemies are always waiting to get them.

Young birds may learn by instinct. Incubator chicks we know learn by instinct alone, but we frequently see the parents teach the little ones to fly, then to secure their food, and finally to sing.

Here is how my Canadian friend, William Thompson, describes the training of the young martins: "Early one morning there was a great ado among the purple martins. The father had started the education of the young birds. He sat in comfort on the tower of the bird-house, scolding like any fish-wife, while around him circled three young birds—two grayish ones, and one as purplish black as himself. Whenever the wearied infants approached the home to beg for an instant's respite, he drove them off with blows and high and vigorous language. He knew his duty and was going to do it.

"All morning the training went on, and we thought of all the human fathers we knew, and realized that among them was not one made so strong by love as this faithful father bird.

"In the afternoon the training began again, but this time he took them away on long flights, sometimes remaining an hour or more. Although we could not follow them, we were sure he was showing them cunning ways of finding beetles and worms and other sweet morsels which are relished by hungry young martins. Each time on

coming back, he practiced them in alighting on their house. The wind was blowing and the little things made many unsuccessful attempts."

So the training goes on until at last the young are able to take care of themselves. Then summer wanes and one day we find the birds all gone—they have felt the call of the South and off they go. When they come back the following spring, each one will have a nest of its own.

CHAPTER XII

QUESTIONS ON THE YOUNG BIRDS

1. When the young bird inside of the shell becomes cramped, what does it do?
2. What happens to the shells in the nest?
3. Do all birds look the same when they come out of the shell?
4. Which birds are able to see and stand as soon as they leave the shell?
5. Which other birds are born with their eyes open and with suits of down, but that can not leave the nest?
6. Which birds come out of the egg almost naked and with their eyes shut?
7. What do these weak little birds do for the first few days?
8. How are they kept warm?
9. Who feeds them at first?
10. What very tiny male bird never comes near the nest while his mate is sitting, nor even feeds the nestlings?
11. Do young birds grow rapidly?
12. Are young birds pretty when the feathers first start to grow?
13. How long do the young birds stay in the nest?

ANSWERS TO QUESTIONS ON THE YOUNG BIRDS

1. When the first hole, the egg, becomes too small for the young bird, it picks at the shell with a sort of tooth that grows on the end of the beak and is called the "egg tooth." This breaks the shell.
2. The shells are carefully picked up by the parents, carried off and dropped some distance from the nest.
3. There is a great difference in the appearance of the birds when they are first hatched.
4. Young ducks, geese, chickens, quail, grouse and other birds that live on the ground, can see as soon as they are out of the shell. They are also covered with soft suits of down, and can walk, run, and swim as soon as hatched.
5. Young hawks and owls are hatched with their eyes open and they are covered with down, but they can not leave the nest.
6. Most of the young birds hatched in trees like the bluebird, robin, wren, etc., are absolutely helpless when they tumble out of their shells. Their eyes are shut and they are almost naked.
7. The young birds that are hatched helpless and almost naked, spend the first few days sleeping. All they demand is to be kept warm and to be fed.
8. For the first few days the mother bird sits on her young and keeps them warm the greatest part of the time.
9. Generally the male bird brings the food the first few days. He may give it to his mate and let her feed the birds, or she may fly away to rest

and feed and he will give the food to the young.

10. The male ruby-throated hummingbird never comes near the nest to watch the eggs or to feed the nestlings.
11. Young birds grow very rapidly and soon tiny feathers begin to appear.
12. The nestlings are far from beautiful when the feathers first start to grow.
13. The length of time the young birds stay in the nest varies. Many leave the nest after twelve days, others stay in for as long as eighteen days.

CHAPTER XIII

FEEDING THE NESTLINGS

IF you have a nesting pair of birds in a place where you can watch them, you are indeed fortunate. When the eggs hatch and the tiny atoms of life arrive, you will see a beautiful example of devotion and fidelity.

At this time, by close observation, you will also learn why birds are of such great benefit to mankind.

Most young birds are fed almost exclusively on insects. Soon after the young bird comes out of its shell, it begins to cry for food and this cry is kept up off and on until it leaves the nest.

A young bird's appetite is enormous. When first hatched, birds are principally mouths, which are ever wide open. The parents work from morn until night to supply them with food, and the number of insects fed to young birds is almost beyond belief.

Some young birds have been known to eat their weight in food in one day. Their digestion is wonderful. A young martin would digest fruit

in less than half an hour, and it only requires a trifle longer to digest insects. All day long, as soon as the young birds hear either parent come near, open go their mouths and they are ready for more food.

The young of birds are fed in two ways. Some birds feed insects and worms to their young, just as they are caught; others are fed by "regurgitation." The parents eat the food and after it is partly digested, they push their beaks into the nestling's throat and inject the food. This is done by flickers, mourning doves, hummingbirds and purple finches, and most birds during the first few days of the nestling's life.

A pigeon in feeding its young, takes the beak of the young one in its mouth and by a spasmodic action of crop and throat, injects the food into the throat of the young.

Young birds are generally fed on the average of every fifteen minutes from dawn until dark. In addition to the feeding, the parents examine and clean the nest almost every time food is brought, and the young birds are pecked over for lice which trouble most young birds.

The snowy egret reaches the nest to feed her young and stands on it apparently disinterested. The young stretch their necks and cry for food and peck at her plumage. At length she raises her beautiful plumes above her back, a token of her

affection, lowers her head and delivers the coveted food. For the younger birds, a more or less soup-like food, fish chowder, is delivered into the mouth of the young bird; for older birds a fish only partially digested is deposited on the nest, where it is picked up and swallowed.

The snowy egrets are extremely affectionate and one or the other always watches the nest. When the absent one returns, they always caress and coo.

Some fish-eating birds, especially the cormorants, feed their young by regurgitation. Others allow the young to swallow skin and bones as well as meat.

The hawks and owls are great providers as they heap quantities of food around the young.

Those of us who have tried to raise a family of nestlings that was deprived of their parents by death, know how difficult it is. It's an all day, every hour job.

Charles W. Nash, in one day, fed 165 cutworms to a three-ounce young robin, and the robin went to sleep hungry. F. H. Mosher saw a pair of rose-breasted grosbeaks feed their nestlings 426 times in eleven hours' time, and the food could not have been less than 848 larvae or caterpillars. Three young wrens, reports Dr. Judd, were fed 110 times in four hours and thirty-seven minutes by the mother bird alone.

A pair of rock wrens carried thirty-two grasshoppers to their nest in one hour.

F. H. Mosher saw a pair of red-eyed vireos feed their three one-day old nestlings 125 times in ten hours.

I personally know of a martin family that fed its young 300 times in one day. The bluebirds at my home fed their young on an average of thirty times every hour. The adults not only carry one insect to their young at a time, but many. I have seen a bluebird with so many insects in her mouth that they looked like a round ball.

I have watched the young birds, but could never tell whether they were fed in turn or not. Of this I am sure, that the parents see that none are neglected. Mr. Parry noted a cowbird in a red-eyed vireo's nest, which received two of every three feedings, while the young vireos had to wait. Of course, young cowbirds are grabbers.

When we consider that it requires only from one to two weeks for a young bird to be transformed from a naked, squirming bit of life to a fluffy little fledgling, we realize that they must need an almost phenomenal amount of food, and we can appreciate that the parents' life is a constant search for food from dawn until dusk.

Here is a good thing to remember every time you think of a young bird's appetite. The late Dr. Kalbfus of Pennsylvania, a good economist,

wrote the following: "Say that we have but one nest of robins to the acre in Pennsylvania, each nest containing four birds, each bird weighing one ounce, only four ounces to the acre, yet it will take at this rate, 3,000 tons of insects to feed the young robins of Pennsylvania for a single day."

It is especially interesting to the bird student to note that the seed-eating birds feed their young on insects. A cardinal, nesting for the first time, caught insects for its young, that it had not caught for itself.

CHAPTER XIV

QUESTIONS ON FEEDING THE YOUNG

1. Do young birds require much food?
2. Who feeds the young birds?
3. Do all birds need feeding?
4. Are all young birds fed in the same way?
5. How are the young birds fed that are hatched fully clothed and able to run or swim at once?
6. In what way are birds fed that are born almost naked and helpless?
7. What is meant by regurgitation?
8. Which birds feed their young by regurgitation?
9. Which young birds thrust their bills down the parent's throat to secure the regurgitated food?
10. How do hawks and owls feed their young?
11. Do hawks and owls feed their young as often as our familiar birds—the bluebird, wren, warbler, etc.?
12. What do pigeons give their young?
13. Which parent feeds the young hummingbirds?
14. Who brings up the young ostriches and young phalaropes?
15. Who attends to the feeding of the young ducks?
16. Does the quail, our familiar bob-white, desert his mate?
17. What do the insect-eating birds like the bluebird, martin, etc., feed their young?
18. What do hawks and owls feed their young?

19. What do the seed-eating birds, such as the sparrow family, feed their young?
20. When do owls feed their young?
21. When do flycatchers and other perching birds start to feed their young?
22. How long do young birds remain in the nest?

ANSWERS TO QUESTIONS ON FEEDING THE YOUNG

1. Young birds require more food in proportion to their size, than their parents. It is necessary to their health and comfort that their stomachs be filled with food during most of the day.
2. Generally both parents feed the young. In many cases the female does most of the work and in some cases does it all. In a few cases the male does both the incubating and cares for the young.
3. To a certain extent all young birds require to be fed.
4. Birds are fed in many different ways.
5. Young chicks, ducks, quail, grouse, plover, snipe and all birds hatched fully clothed and able to run or swim are able, almost at once, to pick up their own living.
6. Birds that are born almost naked and helpless are fed insects, seeds and berries direct as brought by the parents or are fed by regurgitation.
7. Regurgitation means a rushing into the mouth from the throat or stomach. The food is taken by the parent bird and partly digested in its stomach and then regurgitated into the mouth of the young.
8. The young of mourning doves, hummingbirds, and

flickers are fed by regurgitation. Some other birds do so when the birds are very young.

9. Young pelicans, cormorants and ibises thrust their bills far down their parents' throats to secure the partly digested fish from their crops.
10. Hawks and owls tear their prey to pieces and feed it to their young.
11. Our familiar birds feed their young very frequently. It averages once every fifteen minutes during the day, but hawks and owls feed much more at a time, and the time between feedings runs into hours.
12. Both the male and female pigeons have a peculiar secretion in their crops—a result following incubation—which is a curd-like food, the so-called “pigeon’s milk.” This secretion is mixed with the regurgitated food and forced into the mouths of the squabs by the parent. This ceases after the squabs are strong enough to digest their food.
13. The male hummingbird deserts its mate while she is still on her eggs, and the entire bringing up of the little family is left to her care.
14. The males practically take full charge of the young ostriches and young phalaropes. The latter are sea-birds found on the islands of our western coast.
15. Some of the drakes of the wild duck family desert their mates as soon as the first egg is laid, so the entire bringing up is left to the mother.
16. The bob-white is a model mate. He not only helps bring up the first brood, but takes full charge of it while his mate is incubating the second set of eggs.

17. The insect-eating birds feed practically every kind of insect to their young. This includes flies, mosquitoes, ants, caterpillars, leaf-beetles, cankerworms, grasshoppers, crickets, earthworms, locusts, etc.
18. The young of hawks and owls are fed mice, rats, eels, small fish, young rabbits, grasshoppers and, at times, birds.
19. The seed-eating birds, like the sparrow family, feed their young principally on insects which they beat into a pulp before feeding.
20. Owls feed their young from shortly after dusk until just before dawn.
21. Flycatchers, and most of our perching birds, start feeding their young about 4.30 a.m. and keep it up until 7.30 p.m.
22. The periods of time that young birds remain in the nest differ. Of course, those birds that are active at birth such as the chick, quail and our shore- and sea-birds, leave the nest at once, or as soon as they are dry. The hummingbird stays in the nest about three weeks. Young swifts are ready to leave when two weeks old. Most young birds that are born naked do not leave the nest under two weeks and generally it is three.

CHAPTER XV

HOW THE YOUNG BIRD LEARNS

BIRDS first learn to fly, and they do it usually by following their parents from the nest; although now and then they sneak off when their parents are away, then there is trouble.

If the young bird waits until its parents coax it to fly, there is little danger, but when the young bird flies before it is strong, it is very difficult for it to get away from the ground and hence is often killed by cats or other enemies.

All birds learn to get their own food very quickly and each species has a different way of doing it. Birds inherit the song and actions, etc., of their parents just as they do their color, shape, etc. So it is only a short time before they learn to escape their enemies, how to sing, where to sleep, the different calls and cries of their parents and to beware of humans, dogs and cats.

Young birds never return to the nest to sleep. They follow their parents and snuggle up close to a tree trunk or get in a thick tangle of leaves

NESTS OF BIRDS



This quail's nest was found while mowing weeds by the roadside. I tried to get a picture while she was brooding but failed utterly. I didn't visit the nest again for about ten days and then when I went to it I saw a sight both pretty and rare—the eggshells were rolled out in front and the little heads were sticking out from under the mother all round. *C. E. B.*

The nest and young of the
green heron at Wallops Island,
Virginia



NESTS OF BIRDS



Photo A. A. Allen

Paper napkins in a wood-thrush
nest



Wren's nest in a
cow skull

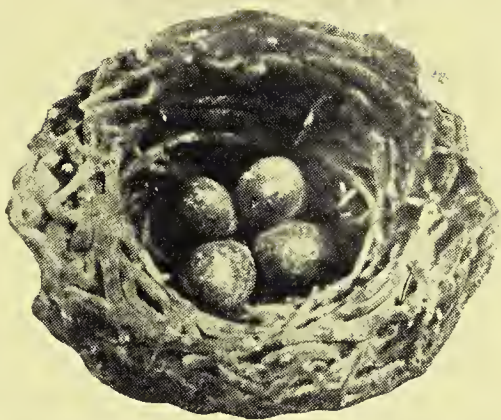


Don't do this! Bird nests
should never be touched. Many
birds will leave the nest if the
nest or eggs have been handled.

Hunt with a camera

NESTS OF BIRDS

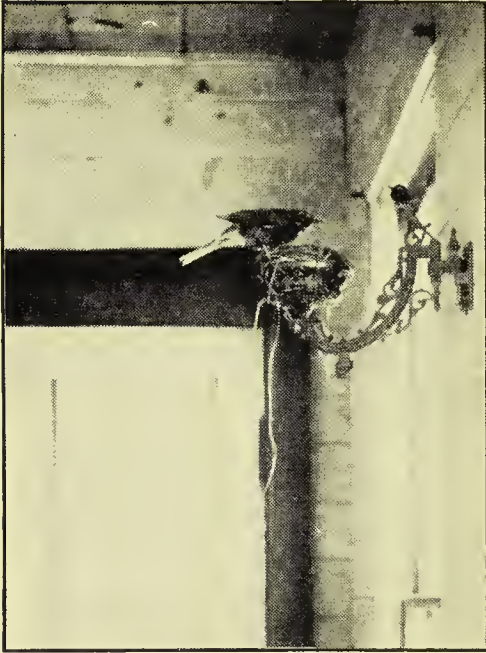
Petrified bird's-eggs have been found on various occasions, but here is a petrified bird's-nest with eggs in it. This was found in the Grand Canyon of the Colorado, in Arizona, 500 feet from the base of the canyon. It was imbedded in a rock formation in a sort of a cliff. It evidently is the nest of some bird about the size of a robin. Scientists of the University of Washington pronounce it the finest specimen of petrified formation they have seen



The nest shown is that of a grebe, sometimes called "hell-diver." The grebe does not have its feet webbed in the usual manner, but by a separate membrane for each toe, united only at the base. The wings are very short, and there is no tail. The legs are attached so far back that when on land this bird assumes an erect attitude like that of the penguin. The grebe builds its nest on the water and it rises and falls with the ebb and flow of the tide. Sometimes the bird paddles away on the surface of the water with the nest under it, in search of a new location. This particular nest was built with three feet of water under it.

and was very slightly attached to the dead branches of a scrub willow. The mother is often seen with the young on her back. By a twist of her neck she is able to thrust food down their gaping beaks without losing her balance or theirs. With an underthrust of her wings, which answers every purpose of a spring-board, the fledglings are thrown into the water, and so acquire very early in life the art of diving

ODD NESTING PLACES



Bullock Oriole with
string

In a dance-hall in Hartland, Wis., there is an unused lamp bracket. Through a broken window-pane a robin gained entrance and built her nest in the receptacle of this bracket, and reared a brood of young robins in peace and safety

Here we have a Mr. and Mrs. Robin who built their nest on the edge of a noisy steam-shovel. (See arrow.) This steam-shovel was going backwards and forwards at work all the time the birds were building the nest and while Mrs. Robin was incubating the eggs. The baby robins were hatched out here and stayed in this nest until they were able to fly. The noise and movement of the big shovel did not seem to bother them



and vines so as to be protected not only from their enemies, but also from the weather. One of the most interesting sights to be seen and heard is to watch the young birds trying to sing.

The young birds learn the call notes of their parents at an early age for this is their every-day language.

Watching the birds with their nestlings is one of the delights of bird study and something that any one can do if he or she has the patience and does nothing to frighten or disturb them. From the Roycroft Shop in East Aurora, New York, a bird lover took a party of nearly 'a dozen' to a place in the woods. There we sat and quietly waited until he called the birds close to us, so we could see the young watched and guided by their devoted and earnest parents.

CHAPTER XVI

QUESTIONS ON HOW THE YOUNG BIRD LEARNS

1. What is the first thing a young bird does by instinct?
2. Who teaches the young bird to fly?
3. Are birds in danger when they first leave their nest?
4. Are the young birds hard to get back into the nest after they once leave it?
5. Are they taught to become expert flyers?
6. After the young birds leave the nest, what do they do?
7. How does a robin train her young to secure food?
8. How does an owl seemingly teach her young to get their food?
9. How does a swallow teach her youngsters to hustle for food?
10. How does a phoebe teach her young to get their food?
11. Do birds teach their young by coaxing or by scolding and driving them?
12. How do the ground birds teach their young self-preservation?
13. Will other species of birds help to save the young if an enemy arrives?
14. Do young birds learn the different calls and cries of their parents?

15. How do birds teach their young to bathe?
16. How do young birds learn to sing?

ANSWERS TO QUESTIONS ON HOW THE YOUNG
BIRD LEARNS

1. A young bird is hungry from its birth and it eats at once by instinct.
2. Birds fly by instinct but generally the first flight from the nest is made by the parents coaxing the young, or while the parents are in search of food. I have seen young birds follow their parents from the nest, but never saw the parents push them out, as it is said they do.
3. Birds are generally in great danger when they first leave the nest. If they land on a tree the parents will come and feed them. If they land on the ground, the poor parents are generally frantic as the young are in danger of being caught by cats. The parents try to coax them into a thicket or to the branches of a bush or tree. Many young birds are lost after this first flight. The exception to this is that some birds, such as ovenbirds, sandpipers, bob-whites and a few others, do not seem to be bothered if the young are on the ground.
4. It is almost impossible to get a young bird to stay in the nest once it has discovered its power to fly.
5. While it's generally considered that birds learn entirely by instinct, they often follow their parents around and around until they become tired. They rest for a few minutes, then try it again. Birds learn to fly very quickly.

6. Instinct and inherited traits seem to make them know what to be afraid of, how to find safe hiding places, how to escape from their enemies, and how to sing; but most of all, how to find food. An observer told me he saw a mother song sparrow apparently teaching her youngster how to build a nest, but that may be but a strong imagination on the part of the observer.
7. The robin takes her little one to the feeding ground and shows him, by example, where the worms live and how to get them. After several feedings she flies away. The young robin calls and calls and as hunger persists he gradually decides to do as his mother did and he eventually finds a worm, much to his satisfaction. The mother then miraculously (to him) appears, hunts and feeds him more worms, then flies away. This is repeated until the young bird learns just how to get his food supply.
8. An owl takes her young to a place where there are young mice. She pounces upon one and soon the owlets follow her example.
9. A swallow takes her young into the air and by dodging this way and that, teaches them how to catch little flies on the wing. Every day the lesson is extended until they learn the secret.
10. The phoebe teaches her young to sit still and watch for insects. Then when they come nearer, to fly out quickly and get them.
11. Birds always teach their young by coaxing and by using infinite patience.
12. By a certain cry the birds are warned that danger is near and that they must hide and keep quiet. They will instantly crouch on the ground and

hide among the grasses or under leaves and keep perfectly still. I once saw a big family of king rails playing around the mother. When I was observed, the mother instantly gave a peculiar call and every young rail disappeared. Even when I walked all over the ground, not one stirred. I then moved away and hid. In a short time the mother rail appeared, gave a call and instantly the birds came to life and scampered here and there. Young birds are obedient.

13. Birds will help each other in time of danger. I once saw a little boy try to pick up a young bluebird, but robins, wrens and catbirds quickly came to the assistance of the bluebirds and succeeded in driving the boy away.
14. The young birds learn the different calls of their parents very quickly.
15. By example and diplomacy. A mother wren got in my bird bath and called her young. He came as far as the edge of the water but would not come in. She splashed and splashed but he just stood and fluttered his wings. The mother wren came out of the water, shook herself and made a dive for a moth flying by. She caught it, flew back to the bath and turned toward her young. That was too much for his little majesty and in he went. She fed him and again started to splash. He hesitated and then followed suit. After the first lesson there was no trouble in getting him to bathe.
16. Young birds, no doubt, learn to sing by instinct. Nevertheless they apparently learn by listening to their parents and following their example.

CHAPTER XVII

THE BIRD'S WONDERFUL STRUCTURE

UNDER the chapter "The Bird," you will find much information about the build and construction of that wonderful creature we call the "bird."

Nature goes the limit in constructing many of her creatures. We have the ponderous elephant, the ugly rhinoceros, the striking giraffe, the awe-inspiring lion, the walking stick, the beautiful luna-moth, etc.

When we come to bird life, we call an ostrich a bird; there is also the ruby-throated hummingbird, yet the difference is vast and striking. One thing, though, you will find on every bird: feathers.

All of God's creatures are wonderfully constructed. The seal is more perfectly constructed for swimming than any bird except perhaps the penguin, yet the bird is, to most of us, one of the most wonderful of God's creations. We have both the flying and swimming types. Man, no doubt, built his boats from the model of a bird.

It is sharp in front, the feathers lie backward, the feet are drawn up or trail behind and there is nothing to hold it back. In most birds the bones are hollow and there are air-sacs under the skin. A bird is perfectly balanced and even the breathing apparatus is perfectly adapted to its mode of life.

A bird can sing while flying. Imagine us trying to sing while running. A bird can live and fly at great heights. Its head is fastened with but one hinge which allows the head to be turned completely around—something no other creature can do. This is well as it gives the bird power to escape from its many enemies.

Every bird's bill and feet are made just right for it to use in securing food as Nature intended. Some have short necks, others long. Some have short legs, others long. There are as many styles in wings as there are in women's hats.

Birds have no teeth, but they digest the hardest seeds.

In studying bird life use good strong glasses and watch its every part, its every action, and you will be repaid a hundredfold for your trouble.

HOW LONG DO BIRDS LIVE?

One of the unsolved problems is the length of life of our wild birds. I have yet to find a record

that tells, with any degree of accuracy, the length of life of our feathered friends.

Comparatively few wild birds die from disease or old age. Their enemies are many, and those that escape their enemies perish from lack of food or from storms. Many birds die during the raging of forest fires. The migration season also is fraught with danger.

Parrots and swans live for many years.

We have excellent records of caged wild birds. C. Emerson Brown gives some remarkable figures of birds that have been confined in the Zoological Garden of Philadelphia. A macaw brought there in 1893, and then evidently four years old, lived until 1920; so it was at least thirty-one years old when it died.

A jackdaw lived there for nine years, and a European raven for twelve years.

A concave-casque hornbill brought there in 1904 was still living in 1929.

A mute swan came in 1909 and is still living at this date, 1929.

It shows how well our wild birds are taken care of in captivity and how they become accustomed to a caged life.

CHAPTER XVIII

QUESTIONS ON THE BIRD'S BEAK

1. What does a bird use instead of a hand?
2. What do we call a bird's beak?
3. Can a bird move both the upper and lower part of its beak?
4. What can it do with its beak?
5. Name eight types of beaks.
6. Name a bird in each type.
7. Which bird uses his beak as a needle?
8. Which bird uses his beak as a chisel?
9. Which bird uses his beak as a spade?
10. Which bird uses his beak as a trowel?
11. Which bird uses his beak as a hammer?
12. Does a bird's beak grow?
13. Can you tell by the shape and character of a bird's beak, his habits and what he eats?
14. Why does a crossbill have a crossed beak?
15. Why is a warbler's beak sharp-pointed?
16. Why does a duck have a wide beak with a strainer at the edge?
17. Why is a field sparrow's beak very sharp-edged?
18. Why do the wading birds have soft and sensitive beaks?
19. Are the beaks of any birds adorned?
20. Which birds use their beaks as musical instruments?
21. Which bird uses his beak in climbing?

22. How is it possible for a merganser, gannet, or other fish-eating bird, to hold its prey?
23. What takes the place of a finger with a bird?
24. Are all birds' tongues alike?
25. What kind of tongues have the birds that eat insect eggs?
26. Which bird uses his tongue as a tube?
27. Which bird has a four-tined fork at the end of its tongue?
28. Describe the tongue of a woodpecker.
29. Which has a rasping tongue?
30. Which bird has a strong, fleshy tongue?

ANSWERS TO QUESTIONS ON THE BIRD'S BEAK

1. Most birds use their beak instead of a hand. Parrots and hawks use their feet for hands.
2. A bird's beak is called "mandible", as upper and lower mandible. The lower jaw is properly called a mandible while the upper jaw is really the maxilla.
3. Some birds can move both upper and lower part of their beak, while we can move only the lower jaw.
4. With his beak, a bird can keep his feathers clean, secure and prepare his food, build a nest, feed and take care of the young and often use it in fighting his enemies. All birds use their beaks as combs and brushes.
5. Eight types of beaks are scooping and straining, tearing, spearing, chiseling, seed-eating, insect-eating, snapper, and gleaning.
6. Ducks have scooping beaks. Hawks and birds of

prey have tearing beaks. Herons and storks have spearing beaks. Woodpeckers have chiseling beaks. Sparrows and finches have seed-eating beaks. Robins and thrushes have insect-eating beaks. Swallows and swifts have snapper beaks. Fowls have gleaning beaks.

7. Orioles use their beaks as needles to weave string and strips of fiber or grass in the making of their beautiful nests.
8. The woodpecker uses his beak as a chisel to cut a deep hole in a tree trunk for a nest.
9. A bank swallow spades out the dirt in the bank to make his nest.
10. Barn swallows use their beaks as trowels to plaster their nests with the mud used in building.
11. Nuthatches wedge seeds in crevices in the bark of a tree then crack them with their beaks, using them as hammers.
12. Yes indeed! a bird's beak grows just like our finger nails, but constant use keeps it always in good shape.
13. A bird's beak tells by its shape what it eats and its habits. Each one is wonderfully made and fitted for its purpose in life.
14. A crossed beak enables a bird to pick seeds from pine cones.
15. A warbler's beak is sharp-pointed so it can pick tiny insects out of blossoms and from under leaves.
16. The duck's wide beak, with its strainer edge, enables the duck to let the water out, but keep the food in.
17. The field sparrow's beak is very sharp-edged so it can break open hard-shelled weed seeds.

18. All wading birds have soft and sensitive beaks, so they can feel their food in the mud.
19. The sex of puffins, white pelicans, and also some of the ducks, is shown by the adornment on the beak.
20. Woodpeckers use their beaks as drumsticks with which they beat a tattoo on a limb, trunk of a tree, or roof. Owls, when angry, snap their beaks together like the minstrel's bones, or the castanets of the Spanish dancers.
21. Parrots, when climbing, always use their beaks most effectively.
22. Birds like the mergansers have serrated beaks so as to hold the slippery fish.
23. A bird's tongue which is almost as wonderful as the beak, takes the place of a finger.
24. Birds' tongues differ. There are many kinds. With man, a tongue is a tongue, they are all alike but not so with our friends the birds.
25. Insect eggs are very small and usually packed tightly in cracks, so birds that eat them have a brush on the end of their tongues which easily sweeps the eggs out from their hiding places.
26. A hummingbird's tongue is like a tube, so it can easily draw up the honey it seeks, out of the flowers.
27. A nuthatch has a four-tined fork at the end of its tongue so it can pick out tiny worms and small grubs from the bark of trees.
28. A woodpecker's tongue has barbs on it so it can spear insects hidden under the bark.
29. Flesh-eating birds have rasping tongues.
30. Seed-eating birds have strong, fleshy tongues.

CHAPTER XIX

QUESTIONS ON THE BIRD'S EYE AND EAR

1. In what way does a bird's eye differ from ours?
2. Are they in the same position as ours?
3. Are all birds' eyes of the same color?
4. Do birds have eyelids like ours?
5. Is a bird's eyesight as good as ours?
6. What can a bird do with its eyes that we can't?
7. Give an example of a time when it is necessary for a bird to change the focus of its eyes.
8. Give an example of a bird using its eyes as a microscope.
9. Give an example of a bird using its eyes as a telescope.
10. Have birds ears?
11. Is their hearing as good as ours?
12. Where are birds' ears placed?
13. What bird can shut up its ears when it wishes to be quiet?
14. Give some examples of birds using their ears as a help in securing their food, and to escape from their enemies.

ANSWERS TO QUESTIONS ON THE BIRD'S EYE AND EAR

1. A bird's eye is round.
2. Owls are the only birds who have eyes turned forward like ours. All other birds have them placed

one on each side of the head so that they can look two ways at once.

3. Birds' eyes differ greatly in color. There are black, brown, blue, gray, light green, dark green, red, pale orange, deep orange and white.
4. Birds really have three eyelids. Two are like ours except most birds use the lower eyelid to close their eyes while we use the upper one. The third eyelid is inside the others and is a thin skin that moves across the eye from side to side. It is called the "nictitating membrane."
5. The perfection of sight in birds is remarkable. It is much more finely developed than ours.
6. A bird can change the focus of its eyes in an instant, so that it can be near-sighted and far-sighted at will. Birds can see much farther than man and their eyes not only magnify, but can also be used as telescopes.
7. A fish hawk flying over the ocean can see a fish in the dark water. As the bird plunges through the air, its eye is kept constantly focused upon the fish and when about to strike it can plainly see its prey. Its eye must have changed focus; for if a man should try to do the same, he would lose sight of the fish before he reached the water.
8. A warbler can see an insect egg which would be invisible if its eyes were like ours.
9. A hawk flying far above the ground can see a mouse running along the ground, which to us would be invisible. Our small insectivorous birds can see a hawk in the sky before it becomes visible to the human eye.
10. All birds have ears but they are not seen as they are covered with feathers.

11. A bird's hearing is much better than ours.
12. A bird's ears are behind the eyes and a little below them, and are covered by delicate feathers that hide them. These feathers can be lifted and look like tiny ear muffs.
13. The owl has little flaps of skin with which to close its ears when it wishes to shut out all noises.
14. A robin is supposed to hear the earthworm move under the sod. A woodpecker taps on a tree trunk and turns its head to listen to the grub within. Game birds pay no attention to the ordinary noises of Nature, but can detect at once the noise made by a human.

CHAPTER XX

QUESTIONS ON THE BIRD'S FEET

1. What other organ shares with the wings, the power of locomotion?
2. Is there any relation between the feet and the wings?
3. Are some birds almost helpless on land?
4. Which bird is exceedingly strong and can outrun a horse?
5. Does a bird stand on its whole foot as we do?
6. Do all birds have the same number of toes?
7. Name six different types of feet.
8. Give an example of each type.
9. What does a webbed foot imply?
10. Name some web-footed birds.
11. Do the wading birds, such as the heron, have a webbed foot?
12. How are the toes placed in the perching birds, such as the bluebird?
13. What peculiar power have the feet of the perching birds?
14. Upon what does the length of the foot depend?
15. Give two examples of birds that have both long legs and long necks.
16. Which birds use their feet in scratching for their food?
17. Which bird uses its feet as hands?
18. Which bird's toes are different in winter from what they are in summer?

MUSSELS AND THE SHORE BIRDS



A few years ago, the late Dr. B. H. Warren and I were walking on the beach at Wallops Island, Va. We found there a Bonaparte gull vainly trying to fly from the ground. Upon examination, we found two large mussels had fastened themselves to the gull's feet. The bird was absolutely helpless, and we had to crush the shells of the mussels to release it. Both legs of the bird were paralyzed.

The photo shows a rail caught by
two mussels

UNUSUAL PHOTOGRAPHS



Did you ever see a bird with one leg? This bird has two, but the other one is so nicely drawn up beneath its body that it is invisible. This is a rather remarkable picture of a flamingo



How would you like sparrow-hawks for pets? Little Martha Ijams, of Tennessee, thinks they are all right. These four were raised from fledglings. Russell Harrison took the picture

19. Which bird is noted as a terrific kicker?
20. Do birds use their feet as weapons?
21. How are the toes of a woodpecker placed.
22. What corresponds to our toe nails in a bird?
23. What is peculiar about the claws of the night hawk and the whip-poor-will?
24. How do birds of prey, such as the hawks, strike their victims?
25. Which bird has a foot especially designed for holding its prey?
26. What is the scientific name for what we generally call the bird's leg?
27. Is the tarsus bare or feathered?
28. How does climate affect this?
29. Is the tarsus smooth like your fountain pen?
30. Which birds walk instead of hop?

ANSWERS TO QUESTIONS ON THE BIRD'S FEET

1. The feet share with the wings the responsibilities of locomotion. What we call the leg of the bird is really the foot, and at the bottom are the toes.
2. It is noticed that short-winged land species, like the quail, have well-developed feet; while the birds of the air, such as the swallows, have long wings but very small feet.
3. The water-birds, such as the grebes and divers, are practically helpless on land.
4. An ostrich has wonderful legs and feet and can outrun a horse. I have seen them race in California.
5. A bird stands only on its toes.
6. Some birds, and the majority, have four toes; some have three and a few only two.

7. Six different types of feet are swimming, wading, perching, grasping, climbing, and scratching.
8. Swimming type is represented by the duck; the wading by the heron; the perching by the robin; the grasping by the hawks; the climbing by the woodpecker; and the scratching by the domestic fowls.
9. A webbed foot shows the ability to swim.
10. Ducks, gulls, cormorants and divers have webbed feet.
11. Wading birds do not have webbed feet.
12. Perching birds have three toes turned forward and one turned backward. They can grasp a branch as tightly with their feet as we can with our hands.
13. When perching birds go to sleep, there is an automatic action in the tendons of their feet that lock them to the perches.
14. The length of the foot is generally dependent upon the length of the neck. Long-necked birds have long feet, or as we incorrectly say, legs.
15. Both the heron and flamingo have very long necks and corresponding long feet.
16. Sparrows, towhees and chickens use their feet in scratching for food.
17. The parrot uses its feet as hands.
18. The ruffed grouse has naked toes in summer, but in winter there is a comb-like fringe on each side. This enables them to walk on snow.
19. The ostrich kicks with such force that the blow has been known to break a man's leg.
20. Birds' feet as weapons, are decidedly effective. The damage done by spurs is well known.
21. Woodpeckers have two toes turned forward and

two backward so they can hold to a tree trunk more easily.

22. All birds have sharp claws on the ends of their toes, which correspond to our toe nails.
23. In the night hawk and whip-poor-will, one edge of the middle claw has teeth like a comb.
24. All birds of prey strike their victims with their sharp claws.
25. The fish hawk's foot is remarkable. The nails are curved, the inner surface of the toes is set with horny spikes and the toes grasp its slippery prey from four different directions. A dead fish hawk that I found on Wallops Island had a fish held so tightly in its claws that I could not remove it.
26. The long, slim part of the foot above the toes of a bird is called the "tarsus".
27. The tarsus is usually bare with a tough, leathery skin, but in some hawks and owls and grouse it is covered with feathers.
28. In cold regions, the birds are covered with feathers down to the toes.
29. The skin of the tarsus is marked in many different patterns. Skilled ornithologists can tell the species by closely examining these patterns. Some are arranged in little squares, others like shingles, and some similar to scales on a fish. All birds with the same markings on the tarsus are related.
30. The crow, cowbird, starling, grackle, red-winged blackbird, partridge, ovenbird, meadowlark, horned lark, pipit, as well as all herons, gulls, snipe, etc., walk instead of hop.

CHAPTER XXI

QUESTIONS ON THE TAIL

1. What does "cauda" mean?
2. What does "caudal" mean?
3. Why do birds have tails?
4. How does the length of the tail affect a bird's flight?
5. How is the tail of a bird formed?
6. Are all the feathers in a tail the same length?
7. Name seven different types of tails.
8. Name a bird in each of the seven types.
9. In what birds are the ends of tail feathers stiff?
10. For what purpose is this?
11. Are tail feathers as strongly rooted as wing feathers?
12. Name some birds that use their tails as a brace or prop.
13. Do birds express emotion with their tails?
14. How do birds express emotion with their tails?
15. Which two birds especially show their vanity by spreading their tails?
16. How does the tail lead to identification of certain birds?

ANSWERS TO QUESTIONS ON THE TAIL

1. "Cauda" means tail.

2. "Caudal" means pertaining to the tail.
3. The main office of a tail is to act as a rudder in flight; as a brake to check speed when alighting; and as a balancer when perching.
4. Birds with short tails can not make sharp turns and generally fly in a straight line, while long-tailed birds can make sharp turns and quickly vary their courses with ease. The hummingbird might be called an exception to the general rule.
5. The tail of a bird is formed of an equal number of feathers in pairs. The number is usually twelve.
6. The tail feathers are not always the same length, and that makes a difference in their shape at the end.
7. Seven different types of tails are: *square*, all feathers the same length; *rounded*, the central pair of feathers the longest, the remainder graduated in length to the outside edges; *cuneate* or *cuneiform*, wedge-shaped, the middle feather longest, the rest becoming shorter regularly; *emarginate*, slightly forked, the middle feather shortest, the rest successively a little longer; *graduated*, the middle feather longest, the rest successively shorter, the difference of length not so great as in a cuneate tail; *pintailed*, the central tail-feathers elongated and narrowly acuminate; *forked*, has the middle feathers shortest, the lateral feathers decidedly longer.
8. The warbler has a square tail; the chewink has a rounded tail; the yellow-billed cuckoo has a cuneate or cuneiform tail; the American goldfinch has an emarginate tail; the bobolink has a graduated tail; the male pintail duck is pintailed, while the barn swallow has a forked tail. Know-

ing the different kinds of tails helps to identify the species.

9. The ends of the tail feathers of woodpeckers, swifts and brown creepers are stiff. The stems or shafts are longer than the feathery part and are very stiff.
10. The birds with stiff tail feathers use their tails as a prop to hold them against the tree trunk or to help them in climbing.
11. No. Tail feathers are pulled out easily. Many birds with tail feathers missing are seen.
12. Tree-climbing birds such as the woodpecker family, chimney swifts, brown creepers and others use the tail as a prop.
13. The tail, more than any other organ, is used to express emotion though possibly not intentionally.
14. Birds, to express various emotions, twitch, wag, spread, droop or tilt the tail.
15. The proud peacock and the turkey cock spread their tails and strut as if they owned the world.
16. The tail is a good way to identify many of our species. Note the phoebe's see-saw motion; the redstart's fan-like opening; the hooded warbler's flashing of the white corners; the palm warbler's wagging; the winter wren's perpendicularity; and the peculiar motions of the catbird, cardinal, etc.

CHAPTER XXII

QUESTIONS ON THE WING

1. Why do birds have wings?
2. Name two species that have wings, yet can not fly.
3. What are birds that can not fly reminders of?
4. Are these birds liable to become extinct?
5. Which bird can fly above and swim below the water?
6. How did the great auk (now extinct) use its wings?
7. What are the only competitors of birds in flight?
8. Can a bat fly as fast as a bird?
9. Can insects get away from a bird by flight?
10. What is the spread in inches of a hummingbird's wing?
11. What is the spread in feet of a wandering albatross's wings?
12. Which group of birds has short wings?
13. Which group of birds has long wings?
14. Name two species of birds that are unable to fly while molting.
15. Which group has practically lost use of flight power through nonuse of its wings?
16. Which familiar bird claps and flaps its wings?
17. Which bird makes a drumming sound with its wings?
18. What does a young bird do when begging for food?
19. Give an example of a bird threatening with its wings.

20. Does any bird use its tail for steering?
21. Which birds have labored flight?
22. Which birds have a circling flight?
23. Which bird flutters in flight?
24. Which birds fly in a direct way?
25. Which birds undulate in flying?
26. Which birds show white on tail-feathers during flight?
27. Describe the difference in the flight of a gull and a tern.
28. What is one of the most perfect power machines in the world?
29. What difference is there in the flight of a crow from its roost in the morning and the way it returns to the roost at night?
30. Which moves its wings the more rapidly in flying, the quail or the swallow?
31. Why does a quail or other short- and round-winged bird have to move its wings so much more rapidly than the swallow?

ANSWERS TO QUESTIONS ON THE WING

1. Birds have wings for locomotion so as to secure food, to escape their enemies and to migrate. Also used as weapons and to express emotion. Once evidently used for climbing.
2. The penguin, a native of the Antarctic, and the ostrich, have wings but do not fly.
3. Birds that do not fly are reminders of an age long gone by when man was not the ruler.
4. Birds that cannot fly are apt to become extinct as they can not fight against man with his gun, domestic dog or cat.

5. The loon can fly above the water and swim below the surface. I have seen them do both off Wallops Island, Virginia.
6. The great auk used its wings only in pursuing its prey under water.
7. Bats and insects are the only competitors of birds in flight.
8. A bat can not fly as fast as a bird.
9. The only way insects can ever escape from birds is by quick dodging. They can not fly as fast as birds.
10. About three inches is the spread of a hummingbird's wings.
11. The spread of a wandering albatross's wings is about twelve feet.
12. Ground birds, such as rail, quail, grouse, etc., have short wings. They usually do not fly high.
13. High-flying birds, such as the swallows, have long wings.
14. Grebes and ducks can not fly while molting. Most birds molt their wing feathers slowly and at no time are there more than three quills missing from each wing. Grebes and ducks molt all their wing feathers at one time, hence are unable to fly until new ones grow.
15. The barnyard ducks have almost lost the use of their wings by nonuse.
16. The rooster, before crowing, always claps or flaps his wings.
17. The grouse make a drumming sound with their wings.
18. All young birds flutter their wings while begging for food.
19. The domestic hen threatens with her wings when

- her chicks are in danger. Geese and swans can deliver forceful blows with their wings.
20. The boat-tailed and purple grackle steers its flight with its tail.
 21. The meadowlarks, sparrows and bobolinks have a labored flight.
 22. Night hawks and swallows fly in circles.
 23. The chimney swift flutters in flying.
 24. Direct flying is done by the robin, crow, oriole, kingfisher, boat-tailed grackle, blue jay and many others.
 25. The goldfinch, snowbird and woodpeckers fly in an undulating manner.
 26. Chewinks, rose-breasted grosbeaks, meadowlarks, juncos, vesper sparrows, kingbirds and several varieties of warblers show white on tail feathers when flying. The chewinks have white triangles on the corners of their tails and the kingbirds have white tips to their tail feathers.
 27. The terns fly with bills directed downward and seize their food on the wing, often by plunging into the water. Gulls carry their heads erect when flying, and pick up their food from the ground or surface of the water.
 28. A bird's wing (and the muscles which move it) is one of the most perfect power machines in the world.
 29. In the morning as a crow leaves its roost, it will fly low in its search for food. At night, it flies high and direct to its roost.
 30. In flying, the quail works its wings from four to five times as fast as the swallow.
 31. Quail and similar birds only fly short distances and as their bodies are heavy, they are com-

pelled to move their wings much faster than the long-winged, light and graceful swallow.

HOW A BIRD FLIES

Did you ever wonder what keeps a bird up, how it can float so easily in the air, and also fly so swiftly?

Robert H. Neill gives this explanation and it is a good one. "The most prominent fact about a bird, in which it differs from every other creature, except the bat and insects, is its power of flying. For this purpose the bird's arm ends in only one long, slender finger, instead of a full hand. To this are attached the quills and small feathers on the upper side which make up the wing.

"Observe how light all this is. In the first place, the bones are hollow, then the shafts of the feathers are hollow, and finally the feathers themselves are made of the most delicate filaments, interlocking and clinging to one another with little grasping hooks of microscopic fineness. An open wing forms a hollow on its under side like an inverted saucer. When the wing is forced down, the upward pressure of the air caught under the concavity lifts the bird up much as you hoist yourself up between the parallel bars in a gymnasium.

“This explains how the bird keeps itself in the air, but how does it sail forward at such terrific speed? He never in this way could get ahead and the hardest question is still to be answered. Now the front edge of the wing, formed of the bones and muscles of the forearm, is rigid and unyielding, while the hinder margin is merely the soft, flexible ends of the feathers; so when the wing is forced down, the air under it, finding this margin yielding the easier, will rush out here and in so doing, will bend up the ends of the quills, pushing them forward out of the way, which of course, tends to shove the bird ahead. This process quickly repeated by the flapping of the wings, results in the bird moving forward in its flight.”

HIS MAJESTY, THE EAGLE

About the only places one sees an eagle today is in our large zoological gardens, and now and then on a gold piece. If in a zoo, his spirit has fled and he looks, and is, a grouch. On the gold piece, he is acceptable, but too hard to secure, and therefore uncommon.

Leaving the Muir woods in California, you come to a little station from which the cars run to Mt. Tamalpais or to Mill Valley. It is a beautiful spot. Just as I reached it, very much out of

breath, a rush of wings was heard and a magnificent pair of golden eagles flew over my head, and the surprise was so great that even my camera was forgotten. Have you ever seen the flight of an eagle? If not, you have missed one of the wonders of Nature.

There are two kinds of eagles in the United States, the golden eagle and the bald eagle. The nobler of the two is the golden whose home is always in mountainous regions although he sweeps over the plains and valleys. The golden eagle is of great size, robust form and powerful physique. Both varieties are brave and show great skill in hunting, and fine courage in defending their nests. A gull has fine control and seems perfectly at home in the air, but compared to an eagle, he is simply an amateur. There is a dignity and ease about an eagle's flying that makes a mere man realize his limitations, and such a flight once seen will never be forgotten.

The eagles made three grand circles and then the female flew to Mt. Tamalpais and was lost in the distance; but the male wanted to give me an exhibition of flying that *was* flying. The aeronaut's flight is a race with death just a few feet away; but the eagle's flight is a glorious conquering of the air with life as a companion. One makes you shiver, the other charms. Around and around the eagle flew, always going higher and

higher up, up, he went. It was hard on the neck, but I could not take my eyes from that bird. He seemed to know that something was expected of him, and he never faltered, but went right up, up, into that sea of blue until he was but a tiny spot, and still up, up, ever upward, he flew, until the speck melted into the azure.

Such scenes are only given to mortals on high days and holidays; that was my high day. Here's to his majesty the eagle! Long may he fly, and may his tribe ever live on the peaks and towering pinnacles, where the sky and clouds meet, and where you and I are strangers in a strange land.

CHAPTER XXIII

QUESTIONS ON THE VOICE OF BIRDS

1. Have birds a language?
2. What do they call the song of a bird?
3. Why does a bird sing?
4. Which is the season of song?
5. Do some birds have a second song season?
6. Which bird usually starts the season of song?
7. When is the season of song at its height?
8. Which bird usually is the first to stop singing?
9. Which birds sing clear up into August?
10. Are there any night singers?
11. What name do we give to the everyday language of birds?
12. What do the "call notes" express?
13. Which birds have sad and rather plaintive songs?
14. Which birds have especially happy and bubbling songs?
15. Which birds have very short songs?
16. Which birds sing long and loud?
17. Do some birds have a regular finished song?
18. Do any birds have long songs which are sung at random?
19. Are any of the birds trillers?
20. Do any of the birds sing when flying?
21. Why are birds able to sing so marvelously?
22. Is it possible to call the birds to you?

23. Which bird is able to produce a "booming" sound that is deep and piercing?
24. Which bird has a screaming voice?
25. Do any birds honk?
26. Does any bird hoot?
27. How many different birds is the mockingbird said to imitate?
28. Do any two species of birds sing exactly alike?
29. Do birds of the same species sing exactly the same song?
30. What birds copy the notes of other birds in addition to their own natural songs?

ANSWERS TO QUESTIONS ON THE VOICE OF BIRDS

1. Birds must have a language although their vocabulary may be limited.
2. The song of a bird is a secondary sexual characteristic, generally restricted to the male.
3. A bird sings to woo his mate, and joyously sings while his mate is nesting. Again, a bird sings and sings for the joy of living. It also sings as a challenge or to discomfit a rival.
4. Spring is the real song season for the birds. This season more or less closely corresponds with the mating season. Some species, though, sing long before the mating season, and a few sing throughout the year.
5. Many birds have a second song season immediately after the molt which follows the breeding period. This late song season is very short.
6. The song sparrows begin the season of song. They are followed by the bluebirds, robins and purple grackles.

7. As May is the month of courtship, the season of song is at its height at that time.
8. The bobolink usually is the first bird to stop singing for the season. The red-winged blackbird also stops singing in July.
9. Indigo buntings, the wood pewees and the red-eyed vireos sing into August.
10. The rose-breasted grosbeak sings at night, and at times the mockingbird, yellow-breasted chat, wood pewee, ovenbird, song and chipping sparrows.
11. The everyday language of birds is the "call notes."
12. Bird calls are remarkable. They express fear, pain, distress, alarm, affection, anxiety, complaint, rage, and love.
13. The bluebird, white-throated sparrow, hermit thrush, meadowlark and wood pewee have what may be called plaintive or sad songs.
14. The happy and bubbling songs are given by the bobolink, song sparrow, goldfinch, indigo-bird and wren.
15. The short songs are sung by the chickadee, bluebird, Maryland yellow-throat, meadowlark, great-crested flycatcher, whip-poor-will, the white-crowned sparrow, chewink, wood warbler, Acadian flycatcher, etc.
16. The long and loud singers are the robin, brown thrasher, oriole, ovenbird, and the winter wren.
17. The hermit thrush, thrasher, chewink, indigo-bird; song, field, tree, white-crowned, fox and the white-throated sparrows; the wood pewee and brown creeper have long songs that are finished works of music.
18. The catbird, purple finch, goldfinch, red-eyed,

white-eyed and blue-headed vireo sing and sing without regard to making it a complete harmonious song.

19. The trillers are the redstart, yellow warbler, ovenbird, clipping sparrow, swift, nuthatch, kingfisher, junco and black and white creeper.
20. Many birds sing when flying, especially the bobolink, bluebird, goldfinch, cowbird, ovenbird, kingbird, swift, red-winged blackbird, indigo-bird, song sparrow, meadowlark, night hawk, purple finch and Maryland yellow-throat.
21. The lower larynx, the voice organ of singing birds, is the most marvelous musical instrument known. The music comes from this organ which is where the bronchial tube forks into the upper lungs. Then there is a wonderful modulating apparatus, consisting of rings and muscles around these tubes, which enable the bird to change its tone and diminish or increase its volume. All this in that tiny little throat, which is far superior to our most lauded prima donna's throat.
22. Many birds will answer a "whistle." The easiest to call are the bob-white, chickadee, killdeer, song sparrow, starling, cardinal, screech owl, and at times, the bluebird and robin.
23. The prairie cock, by inflating two loose sacs on the side of its head is able to produce a "boom-ing" sound that is very penetrating.
24. The blue jay has a screaming voice.
25. Wild geese honk as they speed along in a wedge-shaped flock, far above us.
26. The owls hoot and hoot for hours at a time.
27. The mockingbird imitates the song and calls of thirty-five birds. At Cobbs Island, Maryland, I

heard one sing for several hours and he imitated the song of the flicker, whip-poor-will, phoebe, crow, song sparrow, chewink, ovenbird, wren and bluebird.

28. No two species of birds sing exactly alike.
29. Birds of the same species, while they have the general family song, do not all sing alike. Each bird has some special note or notes that are just his own and by listening carefully you can soon learn to identify and know that particular bird.
30. Birds that especially copy and sing the notes of other birds are the mockingbird and starling.

BIRDS THAT CALL THEIR NAMES

This list is from accurate observations and intent listening. To some, the sounds of the birds' calls are entirely different. Make up your list and compare with this one.

BIRD	CALL
BOBOLINK	<i>bob-o-link</i>
CHICKADEE	<i>chick-a-dee-dee</i>
CHIPPING SPARROW	<i>chip, chip, chip, chip</i>
BOB-WHITE	<i>bob-white</i>
PHOEBE	<i>phoebe, phoebe</i>
TOWHEE OR CHEWINK	<i>tow-hee-e-e or chewink</i>
BLUE JAY	<i>jay-jay</i>
WHIP-POOR-WILL	<i>whip-poor-will</i>
CHUCK-WILL'S WIDOW	<i>chuck-will's widow</i>
WOOD PEWEE	<i>pe-ah-weet, pee-wee</i>
LEAST FLYCATCHER	
(CHEBEC)	<i>chebec</i>

BIRD

CALL

FLORIDA JAY *jay-jay*

WHITE-THROATED SPARROW

OF PEABODY BIRD *Old-Sam peabody, peabody,
peabody*

HUDSONIAN CHICADEE *Chick-a-dee-dee-dee*

KILLDEER *kill-dee, kill-dee*

WILLET *pill-will-willet*

DICKCISSEL *dick-dick-ciss-el*

CHAT *chat*

CHAPTER XXIV

QUESTIONS ON THE DRESS AND COLOR OF BIRDS

1. Of what is a bird's dress made?
2. How many kinds of feathers are found on every bird?
3. Describe a feather.
4. Describe five kinds of feathers.
5. From which part of the skin are feathers developed?
6. From which part do feathers receive their food?
7. When do feathers die?
8. How do feathers grow?
9. What is the difference between the primaries and secondaries?
10. What do birds that spend much time in the water have under their feathers?
11. Which birds have powder-down feathers?
12. What special feathers have some birds?
13. Of what use are plumes?
14. Does a bird take good care of its dress?
15. Do birds oil their feathers?
16. Which birds have especially large oil glands?
17. Give some examples of how birds express emotion with their feathers.
18. Do birds seem proud of their plumage?

19. What gives the various colors to our feathered friends?
20. Which bird is usually the brightest in color—the male or female?
21. Why should the female be more subdued in color than the male?
22. Why is it that ground-inhabiting birds generally have dull or neutral tinted feathers?
23. Does the age of birds influence the color?
24. What kind of nestling plumage have the birds that run or swim, when first hatched?
25. What kind of nestling plumage do those birds have that are helpless when hatched?
26. Is the first plumage of birds always like either one or the other of the parent birds?
27. What is the next plumage of these birds called?
28. Is the "immature plumage" of the young birds like that of either of the parents?
29. When does this "immature plumage" change to the adult plumage?
30. Do birds change color with the seasons?
31. In what other way than the molt do some birds change their color?
32. Give two examples of birds that change color by the wearing off of the edges of their feathers.
33. Does feed have an effect on a bird's color?
34. Does climate have an effect upon a bird's color?
35. Do the habit and haunt of birds affect their color?
36. Describe a "protective color" or what is generally called "protective coloration."
37. Which birds are in need of "protective coloration"?
38. What is a "deceptive" color?
39. What is "recognition" color?
40. What is "sex coloration"?

ANSWERS TO QUESTIONS ON THE DRESS AND COLOR
OF BIRDS

1. A bird's dress is made of feathers.
2. On every bird you find flight feathers, clothing feathers, downy feathers, thread feathers and on some, powder-down feathers.
3. In a feather we have first, a quill; second, a shaft (the white part on which the barbs grow); third, the barbs which go out on each side of the shaft; fourth, the barbules or little barbs which grow on the barbs; and fifth, the barbicels which grow on the barbules.
4. The *flight* feathers are the very stiff and strong feathers of the tail and wing. The *clothing* feathers are the soft clinging feathers on the breast and body, which keep the bird warm and dry. The *downy* feathers are the birds' underclothes and are like their name—downy. The *thread* feathers grow among the clothing feathers and are the hair-like objects we find on the skin of a chicken which is singed. *Powder-down* feathers grow only on certain birds like herons, and are so-called because the tip ends break off like white dust.
5. Feathers are developed from the dermis, or lower layer of the skin.
6. Feathers are nourished from the dermis, or lower layer of the skin.
7. As soon as a feather is full grown, it is no longer nourished by the dermis, but becomes a dead structure, composed of material from the inner layer of the epidermis.

8. Feathers do not grow in a haphazard way, but in well-defined lines called feather tracts.
9. The wing feathers of a bird are of two main groups—the primaries and secondaries. The primaries are on the modified hand of the bird, while the secondaries are on the forearm.
10. Birds like ducks and kingfishers that spend much time in the water have very thick down under their feathers. These, Olive Thorne Miller says, are “like suits of very warm underclothes which keep the water away from their bodies.”
11. Some of the heron family and cockatoos have powder-down feathers. No one seems to know their use.
12. Some birds have plumes. These differ from the ordinary feathers. The ostrich has beautiful plumes.
13. Plumes are usually for ornamentation only, but as said by some, are used by male birds to attract the females.
14. Birds take excellent care of their dress. Most birds daily pass each feather through their bills and then thoroughly shake themselves. Birds preen themselves very carefully.
15. Birds need oil to keep their feathers in good condition and in every bird there is a small gland over the tail filled with oil. This, when squeezed with the bill, gives out a drop of oil.
16. Water-birds need much oil to keep out the wet, so they have large oil glands.
17. All birds, more or less, express their feelings with their feathers. When angry they fluff their feathers, and when nervous, they jerk their tails and wings.

18. Birds realize the beauty of their plumage and keep it in good condition.
19. The coloring of the feathers on our birds is not completely understood. Black, red, and brown feathers are caused by coloring matter in the feathers. Green color is due to some shade of yellow coloring-matter under a surface full of lengthwise ridges or a series of their superimposed plates. Other colors are made in a similar manner. Dr. Newton says that many colors are only the effect of the way the feather is made—whether it has ridges on it, or certain minute specks under the surface, which seem to act as prisms and reflect the different colors of the rays of light.
20. The male bird is usually brighter in color than the female.
21. The female incubates the eggs, and as her color is often more neutral than the male, she is not so easily seen by her enemies. A female scarlet tanager, being olive-green, is almost invisible among the leaves.
22. The ground-inhabiting birds are subject to many dangers, but their dull coats, by blending with the ground and the leaves, make them almost invisible, and so are a great protection.
23. The age of a bird has much to do with its plumage. The first dress of all birds is a special nestling plumage.
24. The nestling plumage of young birds that run or swim when hatched, is a full suit of down. Examine young ducks, young chicks, young quail, etc.
25. The nestling plumage of birds that are born help-

less, such as the bluebird and robin, is so scanty that they are almost naked ; but it is quickly followed by a growth known as "first plumage."

26. The "first plumage" of birds that are helpless when hatched is often entirely unlike the coloring of either parent.
27. The "first plumage" is later exchanged for what is known as the "winter plumage" which is usually worn through the winter.
28. This "winter plumage" may or may not resemble the adult. The study of "early plumages" would make a book in itself. Whenever you have an opportunity, note the coloring of the young birds and check it up with the color of their parents.
29. Immature birds may acquire the adult plumage the next spring, or they may have a first breeding plumage and not acquire adult plumage until the next autumn or the second spring.
30. Many birds change their color with the seasons. All birds shed their feathers after nesting, which is known as molting.
31. Some birds change their color in the spring by the slow wearing off of the fringes of the feathers. This is called "abrasion."
32. The meadowlark in winter is brownish yellow on the breast. In the spring, the tips of the feathers are worn off and the breast becomes yellow with a black crescent. The snowflake in winter is brown and brownish white, but by spring the tips of the feathers are worn off and he is pure black and white.
33. It is a well-known fact that colors of nestlings of the caged canaries can be changed by food. The parrot's color can also be changed by feeding

them certain preparations. The food is given before the molt and the new feathers show the effect. Most wild birds, if caged, will assume other colors when they molt. This is evidently caused by the change in their food. No fully grown feathers can change their color except by fading or bleaching.

34. All ornithologists that have made a study of color say that climate has a great effect upon the birds, and that birds of same species may differ in the depth of their color due to the humidity or aridity of the region in which they live.
35. Ornithologists generally agree that there are four classes of colors: protective, deceptive, recognition, and sexual.
36. Protective colors render a bird inconspicuous in order that it may escape its enemies. (see chapter 25)
37. All ground-nesting birds, such as the quail, grouse, snipe, plover, etc., are always in danger from their enemies, so the colors of their backs are dull brown or gray or spotted like the ground, leaves or grasses around them. Those that live in the trees, among the bright leaves and blossoms are generally more brightly colored, such as the orioles, tanagers, warblers, etc.
38. Deceptive colors are supposed to render a bird inconspicuous in order that it may more easily approach its prey.
39. Recognition color is that conspicuously shown by birds in flight, or by some movement. This is supposed to enable birds to recognize others of their kind. This is shown in the white outer tail-feathers of juncos, meadowlarks, etc., and by

certain wing and rump patches which are noticeable only when the bird is on the wing. Of course there are exceptions to this. Song-sparrows keep together just as well as juncos do.

40. Sex coloration is a much discussed subject and too deep for an ordinary practical book like this. Darwin's theory of "sexual selection" is based upon the ardor in love, the courage and rivalry of the males and also upon the powers of perception, taste and will of the female, but many recent authorities discard much of his theory.

CHAPTER XXV

PROTECTIVE COLORATION

THERE have been volumes written on this subject and more will follow. Nature knew all about camouflage long before the World War brought it to our attention. If Nature had not given many of our birds a protective coloration, they would have disappeared. In bird life, the male is usually brighter than the female, whose colors harmonize with the surroundings of the nest. She is therefore not so conspicuous.

The meadowlark's back is inconspicuous enough, but his gleaming yellow breast would betray him in an instant. So instinct tells him to keep his back turned toward you, so he is almost invisible among the grasses.

Sparrows streaked with shades of brown are almost indistinguishable from the dry grass they nest in, while the female scarlet tanager, nesting in the trees, is not scarlet at all, but green like the leaves.

It is almost impossible to discover a woodcock on her nest, so well does her color harmonize

with her surroundings. The brown creeper will flatten himself on a branch and become so like it that it is hard to see him. I almost stepped on a night hawk sitting on her nest. She was practically the same color as her surroundings. A bittern will hold his long neck motionless and stiff above the stiff marsh grass, his bill pointing directly upwards, so he looks like a dead twig.

All birds seem to believe in this protective coloration, and trusting to their protective coloring to escape being discovered, they only take flight when absolutely necessary. If there is *plenty* of *cover* they never make use of protective coloration. It only comes into play where there is no cover.

QUESTIONS ON PROTECTIVE COLORATION

1. What do we mean by "protective coloration"?
2. In bird life which is usually the brighter in color?
3. Why is it important that the female is not so conspicuous as the male?
4. Name four species of birds that are hard to discover when on their nest.
5. Do birds believe in their protective coloration?

ANSWERS TO QUESTIONS ON PROTECTIVE COLORATION

1. Protective coloration is applied to those birds whose color and their surroundings harmonize to

a remarkable degree. Mr. A. H. Thayer who has given this much study, says that protective coloration lies not so much in an animal's resemblance in color to its surroundings as its gradation of color. Birds, as a rule, are darker above and lighter below and the shadows on the under side make the light parts appear dark and the whole bird uniform and invisible against a dark background.

2. Among birds, the male is usually the brighter in color.
3. The female's color harmonizes closely with the surroundings of the nest, hence is not so conspicuous.
4. The woodcock, song sparrow, female scarlet tanager and night hawk are very hard to discover when sitting on their nests.
5. Birds believe in their protective coloration to escape detection, and where there is cover, will sit perfectly still, and take flight only as a last resort.

CHAPTER XXVI

QUESTIONS ON THE MOLTING OF BIRDS

1. What do you understand by the molting of birds?
2. Do all birds molt?
3. When do wild birds molt?
4. How do wild birds molt?
5. How do birds appear when molting?
6. Do birds sing while molting?
7. Which bird has a complete molt in the spring?
8. Which feathers do most birds molt in the spring?
9. Which bird is adorned with special nuptial plumes in the spring?
10. Are the fall suits of the birds different from their summer ones?
11. Which birds can not fly while molting?
12. Do birds molt before, during, or after migration?

ANSWERS TO QUESTIONS ON THE MOLTING OF BIRDS

1. Molting is the renewing of the bird's feathers. It is the acquiring of a new dress. The plumage during nesting becomes very worn and frayed.
2. All birds, whether the caged canary or the wild bird, molt.
3. All wild birds renew their feathers after nesting and some have a partial or complete molt in the spring.
4. Most wild birds molt rather quickly, one or two feathers falling out at a time. A feather will drop from each wing, and if you look closely you will see that the new ones have pushed the old ones out. When the new ones are partly grown,

EGGS OF BIRDS



The meadowlark's nest with its
roof

Photo A. A. Allen



Ruffed grouse's nest with four-
teen eggs

Photo A. A. Allen

EGGS OF BIRDS

Ostrich, hen and ruby-throated
hummingbird eggs

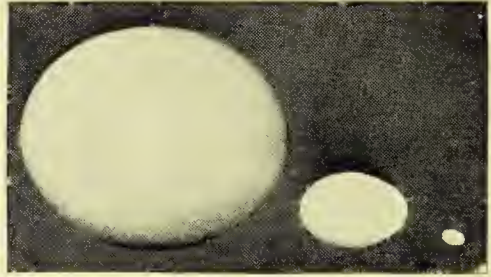
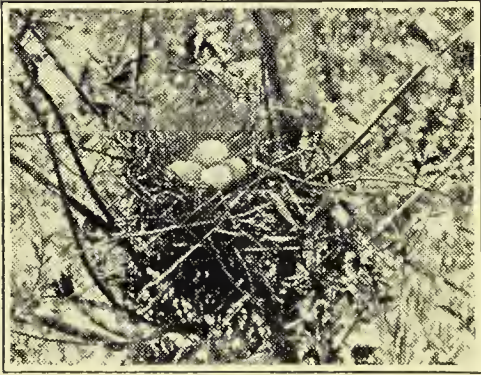


Photo A. A. Allen



The eggs of the green heron

Spotted sandpiper and catbird
with eggs. Notice difference in
size of eggs



another pair will fall out. In this way the bird suffers no discomfort.

5. During molting, birds are secretive and if found, appear gloomy. Evidently molting is a heavy drain on the system.
6. Birds seldom or ever sing during the molting season.
7. The bobolink and some other birds have a complete molt in the spring.
8. In the spring, some birds molt their body feathers, retaining those of the wings and tail, while most of our birds suffer only a wearing off of the tips of the feathers.
9. In the spring the egret and snowy heron are adorned with special nuptial plumes. These are the birds that were killed for years for their beautiful egret plumes. If this trade had not been stopped by law, the bird would have become extinct.
10. Often the new fall suit is entirely different from the old one. The male bobolink loses his beautiful black, white and buff colors and becomes buff and brown-streaked like his mate. The happy goldfinch changes his wedding clothes of bright yellow to the drab-brown family dress.
11. Ducks and some other water-birds molt the wing quills all at once and for a short time are unable to fly. As they are water-birds, they are protected from enemies by swimming and diving. If the land-birds were to molt that way, they would be easy prey for their enemies.
12. In most birds, the molt occurs before migration; a few migrate before they start molting, like certain woodpeckers.

CHAPTER XXVII

THE FOOD OF BIRDS

BIRDS are always hungry and it is a good thing for mankind that they are. They not only fill their stomachs with insects or seeds, but after the stomach is stuffed until it will hold no more, they continue to eat until the crop or gullet is packed full.

Birds may be divided into five distinct groups in relation to their food habits:

First, birds that destroy destructive insects.

Second, birds that destroy destructive weed seeds.

Third, birds that destroy small rodents.

Fourth, birds that eat decaying flesh and thus act as scavengers.

Fifth, birds that eat fish.

There are grubs and worms in the soil that destroy the roots of plants, thousands of insects that eat our grasses, vegetables and crops, and more thousands that work to destroy our fruit and forest trees.

There is not a tree, at any stage of its growth, from the seed to the end of its life, that is not

attacked by hords of insect pests. Insects destroy the foliage, burrow into the bark, attack the roots and even destroy the living heart of the tree.

The service that birds perform in protecting our forest trees is of inestimable value. Next to the earth itself, the forest is our most useful servant. It sustains and regulates the streams, moderates the winds, beautifies the land and supplies wood—the most widely used of all materials.

Birds attain their greatest usefulness in the woods, because the conditions there closely approach the natural, where the balance of organic Nature has not been upset by mankind.

The birds and trees are always closely allied. Insects live on the trees and in some cases, assist in the fertilization of their blossoms; but they also attack the trees and would destroy them, if it were not for the birds which nest in the trees and live on the insects that prey upon the trees.

Few realize that for the several types of insects, Nature has provided a corresponding type of bird to destroy it. The swallows, purple martins, swifts and night hawks sweep through the air and clear it of mosquitoes, gnats and midges.

The kingbirds, flycatches, pewees and phoebes, watch the larger flying insects and as soon as these pests move, their fate is sealed.

Our warblers and vireos search every leaf, top and bottom, and millions of larvae, plant lice, flies, leaf-hoppers and small caterpillars fall victims to their appetites.

Thrushes, cuckoos, orioles, catbirds, wrens, thrashers, and others spell the doom of the hairy and smooth caterpillars, click beetles, grasshoppers, locusts, spiders and other bugs that would eat every green thing on the face of the earth.

Our brave army of woodpeckers work hour after hour in fighting the boring beetles; while the chickadees, creepers and kinglets search the bark for wood-destroying pests.

According to Dr. Forbush, the black-and-white warbler, the red-eyed vireo, and the tanager are three of our most valuable protectors of our forests. He says the black-and-white warbler searches every cranny of the bark for insects; it feeds on wood-boring insects, bark beetles, click beetles, curculios, and the eggs of insects. It searches over the limbs, twigs, buds and leaves, destroying caterpillars, beetles and bugs that are found on bark and foliage. The bird also destroys great numbers of hairy caterpillars.

The red-eyed vireo is one of the most effective enemies of the gipsy moth and the brown-tail moth.

The scarlet tanager is the appointed guardian

of the oaks. Nocturnal moths, such as the *Catocala*, which remain motionless on the tree trunks by day, almost invisible because of their protective coloring, are captured by the tanager. Even the largest moths, like *cecropia* and *luna* are killed and eaten by this indefatigable insect hunter. As a caterpillar hunter the bird has few superiors.

What we might call the caretakers of the ground floor are the quail, robin, sparrows, chewink, ovenbird, brown thrasher, woodcock, grouse, meadowlark and others which eat the insects and larvae that are hidden in the grasses and buried in the ground itself. These are the larvae of May and June beetles, wireworms, maggots of crane flies, root- and corn-borers, grasshoppers, locusts, chinch bugs, cutworms, army worms, boll weevils and thousands of pests just as injurious.

THE WEED SEED DESTROYERS

Weeds are the farmer's foes and a continual war is waged against them. To help the farmers, we have the great army of native sparrows, finches, goldfinches, mourning doves, bobolinks, meadowlarks and others, which not only destroy weed seeds, but insects as well.

A tree sparrow will eat one hundred seeds

of pigeon grass at a single meal and a snowflake has been known to eat a thousand seeds of pig-weed for breakfast.

BIRDS THAT DESTROY RODENTS

Our hawks and owls are tremendous eaters and woe to the mice, rats and rodents they see. If we had more hawks and owls, the mice and rat question would be solved. This subject is treated more fully under the chapter on "Hawks and Owls."

THE FISH-EATING BIRDS

We all know that our sea-birds, the fish-eaters, do much good in fertilizing, soil-building and seed-sowing on many barren islands. They also make the guano of commerce. This consists of the excreta and ejecta of sea-birds, mixed with the remains of birds, fish and other animals. See the chapter on "The Most Valuable Bird in the World."

THE BIRD AS A SCAVENGER

Few realize the great service the birds do for mankind by acting as scavengers. If an animal, big or little, dies, the eagles, vultures, crows

and other scavengers quickly gather and soon tear and eat the flesh from the carcass.

A whale or other big fish is washed up on the shore—immediately the sea-birds (gulls, terns, etc.) gather and devour its body.

Gulls occupy a very important part in Nature's scheme and are essential to man's health. While they eat fish, their greatest function is that of scavenger—clearing our beaches of decaying animal- and vegetable-matter. James Buckland says the wholesale destruction of gulls for their plumage in Yucatan was followed by a great increase of human mortality among the inhabitants of the coast. These deaths were due to the loss of the birds which had kept the harbors and bays free from the decaying matter which the sea is constantly casting up.

The gulls at Monterey Bay, California, gather in immense numbers every day in the year and they keep the waters of the bay near the shores absolutely clean from all offal. It is a very serious offense to kill them.

The Wallops Island Sanctuary, Virginia, is the breeding place of the black skimmer, or flood gull, the least and common tern, and the piping plover. It is necessary to watch the breeding ground, as egg hunters visit the island and gather the eggs for human consumption. Gull

eggs were formerly gathered and sold by the barrel, but this is now unlawful.

There is a close resemblance between the gulls and the terns; the former are larger, stouter birds than the latter. The common tern is as graceful as the gull and is more active on the wing.

Thousands and thousands of gulls and terns were formerly killed for millinery purposes, but this is now stopped.

LOCAL SUPPRESSION OF AGRICULTURAL PESTS BY BIRDS

In a pamphlet prepared by W. L. McAtee of the U. S. Department of Agriculture for the Smithsonian Institution, he states in the summary that "Instances cited relate to thirty-two insect pests, most of them exceedingly injurious. In more than seventy cases birds apparently exterminated one or another of them locally, or at least so reduced them that no further damage ensued. In many of these cases the *saving of a crop* seemed to be *due solely* to the *work of the birds*. It goes without saying that we have accounts of only a small proportion of the instances of pest suppression by birds that have actually occurred, and there is no doubt that the work of birds along this line has been of great value to American Agriculturists."

Hardly an agricultural pest escapes the attacks of birds. The alfalfa weevil has 45 different bird enemies; the army-worm, 43; billbugs, 67; chinch-bug, 24; clover-root borers, 85; clover weevil, 25; codling-moth, 36; gipsy-moth, 46; cut-worms, 98; forest tent caterpillar, 32; cotton-worm, 41; potato-beetle, 25; rice-weevil, 21; seventeen-year locust, 38; twelve-spotted cucumber beetle, 28; white grubs, 67; wireworms, 168; cotton-boll weevil, 66; brown-tail moth, 31; codling-moth, 36; horseflies, 49; leaf-hoppers, 120; and orchard tent caterpillar, 43.

V. W. Jackson, of Canada, says the birds have no doubt saved Manitoba from the devastating army-worm, which on several raids, never got any farther than the southwest corner of the province.

A few years ago, in Southern Saskatchewan, a farmer reported his crop was badly infested. Before an official could get there, word from the farmer arrived saying the official's services were not required as the "gulls had cleaned them up."

SERIOUS CONSEQUENCES OF BIRD DESTRUCTION

According to James Buckland, "Some years ago the agriculturists of Hungary, (moved to the insane step by ignorance and prejudice) succeeded in getting the sparrow (*Passer do-*

mesticus) doomed to destruction. Within five years the country was overrun with insects, and these same men were crying frantically for the bird to be given back to them, lest they should perish. The sparrow was brought back, and, driving out the hordes of devastating insects, proved the salvation of the country.

On the island of Bourbon once, because of the same ignorance and prejudice, a price was set on each martin's head. The birds all but disappeared, and grasshoppers took possession of the island. The edict of banishment was hurriedly revoked and the exile recalled. Fortunate, indeed, was it for the island of Bourbon that the bird was not beyond recall.

During the year 1861 the harvests of France gave an unusually poor return, and a commission was appointed at the instance of the minister of agriculture to investigate the cause of the deficiency. By this commission, the deficiency was attributed to the ravages of insects which it was the function of certain birds to check. These birds, it appeared, had been shot, snared, and trapped throughout the country in such numbers that but little repressive influence has been exerted upon the insects. It was concluded that by no other agency than the birds could the ravages of insects be kept down, and the commission

called for prompt and energetic remedies to prevent the destruction of birds.

PROTECTING FRUIT AND BERRIES

Robins eat the early cherries because they are fruit hungry, though it is a well-known fact that robins prefer wild fruit if they can get it. King Frederick of Prussia, who was very fond of cherries, saw that the birds were eating them, and he ordered the winged thieves killed. A few years later the king discovered the cherry trees did not yield, the fruit being destroyed by insects and caterpillars, which the birds had previously kept in check. The law was repealed, and at a great expense birds were imported to the king's orchard.

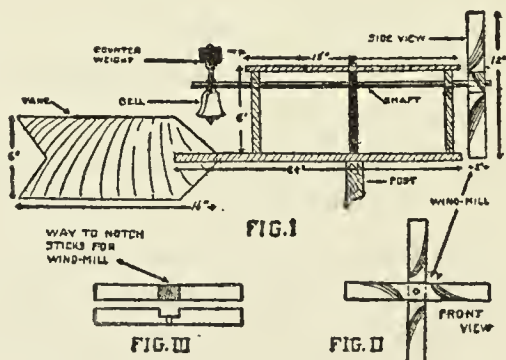
Mr. Baker says: "It is as illogical to say a robin redbreast should be killed because it eats a few cherries as to maintain a horse should be shot to death for eating the grain in your barn."

A game warden of Pennsylvania arrested a trucker for killing twelve robins in his cabbage patch. He admitted the killing, saying: "These birds were pulling up and destroying my cabbage plants." A thorough examination was made, and it was found that not a single root had been pulled from the ground, but the plants had

been cut by wireworms, as many as forty-three being found around one root. The robins had been eating the worms and gathering them for their young. They did a great work for the trucker. His attorney said that "he did not understand."

Kingbirds (and they are great fighters) nesting in cherry trees will keep robins away. To attract kingbirds, keep bees. The kingbirds eat beetles, canker-worms and winged insects and drone bees.

The best way to frighten birds away from fruit trees and berry patches is to use windmills.



F. E. Brimmer makes them this style and I know of none better. These windmills are made of two pine pieces, twelve inches long by two inches square. They are notched in the middle to fit together, as shown in Fig. III. After the pieces have been placed together, the corners

should be whittled to form blades about a quarter of an inch thick, and standing at an angle of about forty-five degrees to the wind. The windmill turns on a shaft twenty-four inches long.

To support this bell-ringing device, he used a base six inches wide by twenty-four inches long. Upon this base two upright posts eight inches high are fastened by toe-nailing. An inch from the top of each post, a clean half-inch hole is bored to receive the shaft. A stick eighteen inches long, nailed across the top of the posts, gives stability and also makes a convenient place for a hole to be bored. This hole receives the pin that holds the windmill on its posts twelve feet from the ground.

The bell is of the handle type, three inches in diameter, and is wired to the rear end of the shaft. Strips of lead should be wound about the handle of the bell to act as a counterweight to the metal part of the bell. A vane, fastened as shown, points the windmill windward.

OTHER HINTS

In planting corn, a page of newspaper was torn off and one corner buried in the ground, leaving the other three corners to flap in the wind. The crows gave this garden a wide berth.
A. E.

Here is the way I protected the strawberries and the birds at the same time. I made a bluebird house with rooms for at least four pairs of bluebirds. Set it on top of a post in the center of the berry patch. This encouraged the birds to build in it. They kept other birds away from the berries. Bluebirds eat only the insects off the fruit. *D. T.*

Blackbirds are not destructive. If you find them among the corn when it first comes up, take a harrow or cornplow and harrow or plow a few rows here and there across the field, and the birds will leave the corn and begin to hunt worms and bugs on the newly-plowed ground. We destroy the English sparrows here in the winter. *L. F.*

FEEDING ORPHAN BIRDS

There are times when young birds are deprived of their parents and it is necessary to feed them to prevent them from starving to death.

The natural food of most young birds is insects, and if they can be found in sufficient number, well and good, but very often the insect diet must be added to by artificial food.

Here is the formula for food prepared for young martins which proved excellent, and I believe it would do for other birds: No. 1. Raw beef,

free from fat, was taken and run through a meat chopper; two medium-sized carrots were grated; one and one-half shredded wheat biscuits were mashed and mockingbird seed added in proportion of one part beef, one and three-quarter parts carrots, one and one-quarter parts shredded wheat, and four parts seed. Raw whites of eggs were used to moisten the food well and to make it sticky. These ingredients were then well mixed and run through the meat chopper again. It came out like worms one-sixteenth of an inch in diameter.

No. 2. Instead of meat, use mashed or boiled potatoes. Other ingredients like No. 1. Do not use this combination very often.

No. 3. Exactly like No. 1, except very hard-boiled yolks of eggs instead of meat.

No. 4. Use lamb, free from fat, instead of beef, with any of the other combinations. Lamb and carrots are laxative. Food was made fresh every night and kept in glass jars for the feeding to be done the following day. It must not be fed so cold as to chill their stomachs. The birds were fed every hour during the day (up to 7 p. m.) for the first eleven days. The time between meals was then gradually lengthened to three hours by the time the birds were ready to fly.

Alternate each feeding with insects, bugs or meal-worms. Foods No. 1 and No. 3 were the

most successful, although a change is essential. Reduce quantity of meat as the birds grow older.

HOW THE FOOD WAS GIVEN

When the food came from the chopper it was in rolls about one-sixteenth of an inch in diameter. At each feeding a bird would receive about four inches of these rolls. The food was held in little forceps and the birds would quickly grab it.

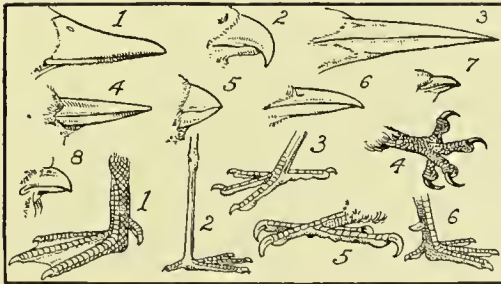
Six to nine meal-worms were usually given at a meal. Common sense must be used in quantity of food that is given and a careful watch kept over the birds to see that every organ is working properly.

As young birds do not drink, water must be given by means of sound berries. Raspberries, huckleberries and blackberries were cut in halves and a little fed daily with their food. When twenty-one days old a dish of water was placed in their house. If a bird was mopey and refused to eat, a little raw white of egg was put in its mouth. This would usually get the stomach in condition.

BILLS AND FEET OF BIRDS



Here is a bird with a price upon its beak. In New Zealand they offer five pounds reward for each kea captured. This bird is a species of a wild parrot and causes immense loss to the sheep raisers of New Zealand. The bird attacks the sheep with its sharp beak



TYPES OF BILL

1. Scooping and straining bill
Duck
2. Tearing bill
Hawk and birds of prey
3. Spearing bill.....Heron, stork
4. Chiseling bill.....Woodpecker
5. Seed-eating type
Sparrows, finches
6. Insect-eating type
Robins, thrushes

7. Snapper type...Swallows, swift
8. Gleaning bill.....Fowls

TYPES OF FEET

1. SwimmingDuck
2. Wading.....Heron, stork
- 3. Perching
Swallow, robin, sparrow
4. Grasping.....Birds of prey
5. ClimbingWoodpecker
6. ScratchingFowls

TWO UNUSUAL PHOTOGRAPHS



How one of the bird-houses of
Mrs. A. H. Morgan of Idaho
looks in winter

Nearly all our feathered friends eat insects, but few people realize the enormous number of insects that are fed by the parent birds to their young. Nor do we realize the size of some of the insects that are forced down the throats of the youngsters. Look at the size of the insect about to be fed by a field-sparrow to her young



FEEDING THE YOUNG



Song Sparrow feeding bugs to young. See the bugs?



Photo A. A. Allen

A yellow-billed cuckoo feeding caterpillar to young

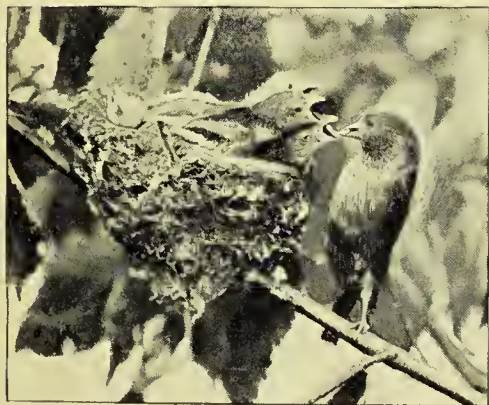
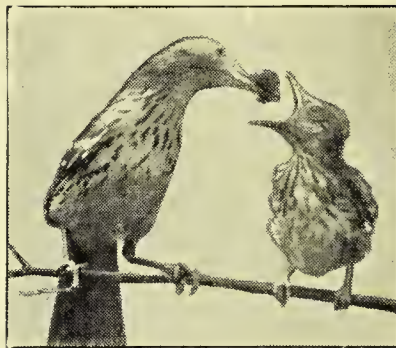


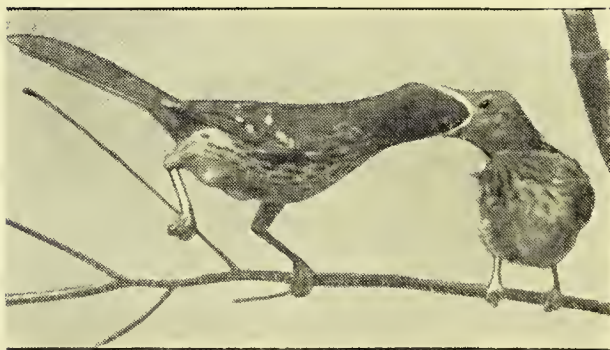
Photo A. A. Allen

The goldfinch brings enough for all

FEEDING THE YOUNG



Ready———



(Photo by L. W. Brownell)

Go!

A brown Thrasher feeding her young. Note size of beetle



Photo A. A. Allen

Chipping sparrow feeding young cowbird

CHAPTER XXVIII

QUESTIONS ON THE FOOD OF BIRDS

1. How do birds find distant food?
2. Into what classes can our birds be placed in relation to their food?
3. Why is it birds have such big appetites?
4. How do birds of prey, herons and some of our larger birds stuff themselves?
5. How do pelicans store food?
6. As birds have no teeth, what aids the digestion of their food?
7. Which intestines are the longer, the vegetable-feeders or flesh- and fish-eating species?
8. Which birds require the most food—the seed-eaters, or the insectivorous birds?
9. What organization has done much toward finding out the food of birds?
10. Give some examples of the amount of food eaten by our insectivorous birds.
11. Give some examples of the amount of food eaten by our seed-eaters.
12. What good do the berry-eating birds do?
13. What good do the flesh- and fish-eating birds do?
14. Which birds prune our trees?
15. How many species of birds feed on hairy caterpillars?
16. How many species of birds feed on plant lice?

17. Do birds eat insect eggs?
18. Which birds eat potato beetles?
19. Which birds eat cutworms that are so destructive in our gardens and fields?
20. Which birds eat scale insects?
21. How many species of birds eat the gipsy-moth?
22. Name some other very destructive insects eaten by the birds.

ANSWERS TO QUESTIONS ON THE FOOD OF BIRDS

1. It is generally believed that birds find their food by their wonderful sense of sight and by their hearing. The sense of smell is not so well developed.
2. There are insectivorous birds—that is, birds whose food consists principally of insects; seed-eaters; small rodent destroyers; fish-eaters and scavengers. Practically all land-birds feed insects to their young.
3. Birds' digestive organs are so constructed and equipped that they not only contain, but digest a large quantity of food very quickly. The food is often crushed by the beak. It then receives saliva from the mouth and passes through the pharynx into the gullet or crop, as the case may be. These organs are capable of great distention. From the gullet or crop, the food is carried to the glandular portion of the stomach where the process of digestion begins. Here the food is mixed with various secretions and it goes into the gizzard where the food is ground fine. The process of digestion is very rapid and the salivary glands, liver and pancreas quickly pour their

secretions into the alimentary canal. The chyle is drawn off by the lacteals and the waste is excreted. High temperature, perfect respiration, and rapid circulation aid in the rapid digestion of food. In the young birds, the digestion is even more rapid than in the old birds.

4. Our birds of prey, herons and others, with their stomachs full, fill the gullet to the very mouth, while awaiting the digestion of the food.
5. Pelicans have a large external receptacle, or pouch beneath the beak, where a store of food can be carried.
6. Birds have gizzards which contain sand and gravel. This mineral matter grinds the food and takes the place of teeth.
7. The vegetable-feeding birds have a much longer digestive tract than the flesh- and fish-eating birds.
8. The seed-eaters' food is more concentrated than the insectivorous birds so they do not require so much food.
9. The Bureau of Biological Survey of the United States Department of Agriculture has examined the contents of thousands of bird stomachs and has done much to show the great value of bird life.
10. Professor Beal found 217 fall webworms in the stomach of a yellow-billed cuckoo and in another, 250 American tent caterpillars. A flicker was found to have eaten 5,000 ants and the Professor took 90 entire grasshoppers and 102 additional jaws from the stomach of a Franklin gull. Professor Harvey found 500 mosquitoes in a night hawk's stomach. Mr. Mosher says a Maryland

yellow-throat will eat 3,500 plant lice in an hour. The late Dr. Warren told me that he took 28 cutworms from the stomach of a red-winged blackbird.

11. Our seed-eating birds are great destroyers of harmful weed seeds, as they break the seeds and destroy the germs. In the stomach of a mourning dove, 9,200 seeds were found. It is estimated that the tree sparrows, in the state of Iowa alone, eat annually 875 tons of weed seeds. In a bob-white's stomach was found 5,000 seeds of pigeon grass.
12. The berry-eating birds do not crack the seeds of the berries they eat, and as they do not digest, they are dropped whole and are ready to grow wherever they fall.
13. The hawks and owls do much good by destroying mice, rats, ground squirrels and gophers. They also eat grasshoppers and other injurious insects. The shore- and sea-birds eat fish that are of no use to man and they also eat insects and destroy harmful forms of marine life that would pollute our shores. The sea-birds, that live on isolated islands are makers of guano which consists of the excreta and ejecta of sea-birds mixed with the remains of fish. This is extremely valuable as a fertilizer.
14. Nature has many ways of pruning. Superfluous buds are nipped off by the ruffed grouse, rose-breasted grosbeaks and purple finches. Jays, hawks and crows break off twigs and branches to use in nest building.
15. Fifty-three different species of birds have been observed feeding on hairy caterpillars.

16. Thirty-eight different species of birds are known to feed on plant lice.
17. One of the great benefits of our birds is in their destruction of millions of insect eggs, pupae and larvae.
18. Potato beetles are eaten by rose-breasted grosbeaks, quail, cuckoos, hairy-woodpeckers, chickadees, whip-poor-wills and others.
19. Cutworms are eaten by robins, crows, wrens, catbirds, shrikes, meadowlarks, Baltimore orioles, brown thrashers, red-winged black-birds and cowbirds.
20. Scale insects are eaten by woodpeckers, cedar-birds and bushtits.
21. About thirty-eight species of birds destroy the gipsy-moth.
22. Weevils, May beetles, chinch bugs, wireworms, crane flies, cotton worms, grasshoppers, and crickets and the army worm, with hundreds of other destructive insects are eaten by our American birds.

BIRDS THAT EAT FISH

There are many birds that eat fish and frequently we hear some one who knows little about the economic value of our bird life say that the fish-eating birds should be destroyed. First, most of the fish eaten by birds are of no value to man; and second, the fish-eating birds also eat many destructive insects and act as scavengers.

Among the well-known fish-eaters are the cormorants, bitterns, ospreys, gulls, herons, kingfishers, swans, ducks, penguins, murres, grebes, loons and pelicans.

Penguins, murres, grebes and loons pursue fish under water. In pursuing their prey they use both their feet and wings and they *appear* to fly under water.

The pelicans have a deep pouch with which they scoop up a big mess of fish and of course much water at the same time. Then, with a peculiar lifting of the head, the water is drained out and the birds swallow their catch at one gulp. The ones I saw near Salt Lake City were some distance out in the water when they began to flap their wings and start for the shore with their mouths open. The fish were driven ahead of them and became easy victims.

A kingfisher will sit on a limb overhanging a stream and patiently wait until he sees a fish he desires. He then dives and catches the fish in his bill. Kingfishers also eat mice and many injurious insects.

The osprey, or fish hawk, will sail high up over the water and when he sees his prey, will drop like a plummet, seizing his prey with his talons which are described elsewhere.

Hérons stand silently until they see a tidbit, then they make a dive and grab it with their

spear-like bill. The grebe is an expert in the water and one of the fastest in his pursuit of fish under water. The late Dr. Warren, and others, have noted that grebes eat their feathers, probably when molting and balls of feathers are usually found in their stomachs.

THE MOST VALUABLE BIRD IN THE WORLD

If you ask most folks which is the most valuable bird, they will say at once the domestic fowl, and there is a reason, for in 1926 the value of the poultry and egg industry was more than \$1,050,000,000.

But we will leave the domestic fowl out of this and compare some of the other birds. What would we do without our insectivorous birds that destroy the pests that attack everything raised by man?

And again, our weed-seed-eating birds are invaluable because weeds can make our most valuable crop a failure.

Our vultures and birds that act as scavengers do an inestimable amount of good by eating what would be apt to cause disease plagues. Our game birds supply food to thousands.

All these birds work for us and are loved by us, yet there is a bird in South America, called the Peruvian Cormorant, that is said by such a

good bird student as Robert Cushman Murphy to be the most valuable of all. He bases his belief on "Dollars and cents and with reference to effect upon human life and human geography."

The cormorant, or guanay, is a sea-bird and exists in countless millions along the arid, western shores of South America for a distance of 2,400 sea miles. The guanay stands and walks erect something like a penguin. Its height is about twenty inches and a full grown bird weighs about four and a half pounds. Its neck and back are glossy green and blue-black; the throat and under-parts are white. Its feet are pink.

Their nests average three to each square yard and Dr. Robert E. Coker in the *National Geographic Magazine* estimated on South Chincha Island, a single colony numbered 1,000,000 adult birds. The breeding season is continuous—each pair having two broods a year. Their food consists entirely of fish, principally anchovies.

Now why is this bird so valuable? From pre-historic times, guano, made by the guanayes, on these islands has been used in the agriculture of Peru and shipped to all parts of the world. Today, this business is in the hands of the Government and the annual output is 90,000 tons. Those who knows the value of guano as a fertilizer can appreciate Dr. Murphy's belief that these birds are the most valuable in the world.

CHAPTER XXIX

THE ENEMIES OF BIRDS

WHEN in this so-called enlightened age, you see a photograph of a "sportsman" who is decorated with one hundred and sixty-five quail, shot in a two-day hunt, you may well say that *man* is still the worst enemy of birds. His love of destruction, under the name of sport, his selfishness and ignorance, are factors that must be studied if bird protection is to become a success.

In all Nature there is a struggle for existence and the weaker succumbs. There is such a thing as a false balance in the development of animal life, and it is necessary for man to restore the proper one. It is impossible to treat all birds of prey and bird enemies alike. Nothing should be destroyed simply for the sake of persecution; but, at times, man should be allowed judiciously to reduce those birds or animals that have abnormally increased and are destroying beneficial, song, and insectivorous birds to such an extent that they are liable to be exterminated. If game

birds are protected and encouraged to increase, a reasonable open season is not objectionable. The enemies of birds vary in different sections of the country, and bird lovers must use discretion as to their destruction.

BIRDS THAT DESTROY OTHER BIRDS

The goshawk, sharp-shinned hawk, Cooper's hawk, and pigeon hawk are all enemies of other birds and possibly do more harm than good, though it all depends on the definition of good and harm. These birds killed other birds for countless ages without affecting their abundance. It is probable that by killing the weakest individuals they kept up the standard of the race and keep the small birds active and alert. This is supposed to be Nature's reason for predacious birds and mammals. The sparrow-hawk at times eats small birds, but unless they become too numerous, they should not be destroyed.

The blue jay, one of our most beautiful birds, does much damage to other birds, and Mr. Samuels says that its food in the late spring and through the greater part of summer, consists of the eggs and the young of the smaller birds. There can be no doubt that they are very harmful in certain localities, and can increase to such an extent that most of the other species are driven

out or killed. In such places, they should be reduced in numbers.

All the owls kill birds, but their diet is principally of mice, rats, rabbits, hares and other rodents and they should be protected. The snowy owl is extremely destructive to bird life and its value is doubtful.

The English sparrow is a pest and should be greatly reduced in numbers. The northern shrike is a killer of small birds and does more harm than good.

All our arguments for "good" and "bad" birds are based directly or indirectly on the value of birds in dollars and cents. All birds have a right to live: In past ages Nature did not need man to regulate her affairs. It is only because man upset the balance of bird life that certain birds became classed as "good" and "bad."

THE CROW

The following is from a survey made by *The Farm Journal*, and it is believed to be the most accurate and complete report ever made on the crow. The reports were received principally from farmers, and every state in the union was represented. The total acreage represented amounted to 1,285,586 acres, by far the largest area ever covered by a survey of this kind.

Of the 9,731 reports

1,801 were for the crow

7,829 were against the crow

18.7 per cent. for; 81.3 per cent. against.

101 reports were neither for nor against the crow.

SAINT OR SINNER?

Of the total, 4,979 reports, or over 50 per cent., said the crow did no good at all; 7,573 reports stated the crows destroy crops; 6,937 reports stated that the crows destroy poultry; 4,112 reports stated the crows destroyed animals (these animals were young pigs, young sheep, young calves and rabbits); 6,799 reports stated the crows destroyed song birds; 6,493 reports stated the crows destroyed game birds; 6,259 reports stated the crows destroyed insectivorous birds; 1,801 reports stated the crows did no damage, or very little damage whatever, and that they destroyed cutworms, grubworms, wireworms, grasshoppers, meadow-mice, angleworms, May beetles, young Colorado beetles, gipsy-moths, and they drove away hawks and acted as scavengers. Most of the reports in favor of the crow failed to give specific instances of the good they did, but simply stated they did no harm.

Thirty-five per cent. of the reports in favor

of the crow were sent in by women, the majority of whom lived in places where the crow was not abundant. The following are typical instances of damage done by crows, taken from the reports:

THE DAMAGE TO SONG AND INSECTIVOROUS BIRDS

Sixty-nine per cent. of the total number of reports received stated that the crows destroyed the birds—in fact, the only birds mentioned as not destroyed by crows were orioles and kingfishers. The birds noted in the reports as being special sufferers from crows were meadowlarks, thrushes, robins and cedar waxwings.

THE DAMAGE TO GAME BIRDS

Reports stated that the crows were almost exterminating, in many localities, prairie chickens, grouse, and quail, the great destruction being in the destroying of the eggs and young. The eggs and young of pheasants and partridges were also destroyed. Reports from the Virginia coast said both the common and fish crow destroyed the wild ducks.

THE DAMAGE TO CROPS

Pulling up young corn; destroying corn in the milk stage; destroying corn, oats and wheat in

shocks; destroying apples on the tree; destroying the lettuce fields; ruining the watermelons and muskmelons; eating cherries, destroying peanuts in the drying stacks; destroying seed potatoes—these were the reports on crop damage.

THE DAMAGE TO ANIMALS

Thousands of cases reported where the eyes were picked out of young pigs and young lambs; and a few cases where young calves were destroyed. Many reports on damage done to rabbits.

THE DAMAGE TO POULTRY

The eggs and young of chickens, turkeys and guineas were destroyed, the damage being as high as \$200 on a single farm.

THE DAMAGE BY CARRYING DISEASES

Reports stated that hog cholera and poultry diseases, especially feather-mite, were carried by crows.

THE SPECIFIC GOOD DONE BY CROWS

A report from Missouri (400 acres) stated, in 1914, two crows' stomachs were opened. In

one, ten cutworms, but only two grains of corn, were found. In the other, only cutworms were found. The number of crows on this farm was not given.

A Montana report (160 acres) stated that crows destroyed great numbers of grasshoppers in 1919 and 1922. In the same report, it stated crows ate many meadow-mice in 1923. The number of crows on this place was: March and April—few; May—two to six; June and July—six to eighteen; August and September—twenty to sixty; October—few or rare.

A Massachusetts report (68 acres) stated a crow's stomach was found to contain only one kernal of sprouted corn, but many cutworms, May beetles, and white grubs. Number of crows on farm, not stated. Other reports stated that the crows did not destroy the farm crops, animals or birds; but that they ate wireworms, gipsy-moths and young potato beetles, and also drove away hawks and acted as scavengers.

In forming a judgment on these reports, due weight must be given to the fact that they were invited and received by mail. It is natural, therefore, that farmers who had suffered severe damage from crows would be apt to write and record their disapproval, whereas those who had suffered little or no damage would take a less lively interest in the subject. The fact that 18.7 per cent. of

the reports were favorable, therefore, indicates a more widespread feeling that the crow is more beneficial than the actual percentage figures would justify.

Taking all the factors into consideration, after thorough analysis of the reports, we believe the following statement to be as accurate and conclusive as can be secured:

First: The crow, *wherever found in large numbers*, is injurious to farmers from March to December inclusive.

Second: Wherever crows are numerous, they should be reduced in numbers and this should be done under, and with, the active co-operation of the state or national agricultural authorities. *The crow need not be exterminated.*

Third: The good crows do by eating insects does not compensate for the damage done by eating eggs and young of the other insectivorous birds.

Fourth: In acting as scavengers, crows carry disease; farmers should bury or burn at once, all dead animals.

THE WOMEN

There was a time when women of the United States required about 5,000,000 birds yearly to ornament their hats. Fortunately those days are

FEEDING THE YOUNG



Photo A. A. Allen

The hummingbird at home



Mrs. Phoebe works overtime to fill these mouths

FEEDING BIRDS



One way of feeding suet. A better way is to put fine-mesh wire around it



Winter is the time to get better acquainted with birds, and this can be done by feeding them regularly and using a variety of food.

Don't forget it is always best, if there is snow on the ground, to lay some bagging on the snow first, then fasten it down with stones and put the feed on it.

Be sure to hang up some suet and fat meat and to put out some old mortar and fine grit.

The photograph above was taken by Louis M. Young, of New York. The birds came to his feeding place regularly. A junco is shown on the right, a tree sparrow on the left.

THE FLIGHT OF BIRDS



Breaking the altitude record and no danger of falling



He does everything, and more than the hydroplane

THE FLIGHT OF BIRDS

Rather dignified here



But oh, boy! look at this!



The pelican is a funny bird. Whether he is aware of the fact that he looks 100 per cent better at rest than he does when in action, I am unable to say, but such is the fact. To illustrate this fact, compare the two pictures here shown

over. England formerly imported yearly 6,000 plumes of the bird of paradise, and it almost exterminated these beautiful birds. According to Reginald Wright Kauffman, at one time the United States and South America sent to the British Isles 400,000 hummingbirds every year.

The white heron egret, one of the most beautiful plumes in the height of its fad, cost the milliner \$32 an ounce. This coveted plume is grown only in the breeding season, and the mother birds that bear it must then be shot, without any hint of "sport," while actually on their nest. This means the sacrifice of the parent and the ruthless desertion of the starving young. It was expensive because women preferred it and it nearly wiped out of existence the birds from which it was obtained.

THE WEASEL, FOX, RACCOON, MINK, SKUNK

are frightfully destructive to bird life and while they may have their particular work to do, it is not on the side of the birds. The late Dr. Warren, of Pennsylvania, said: "I am now satisfied that the birds destroyed by the skunk, in various ways, would, if let alone, do far more good than that animal can do, and none of its harm."

In the celebrated European experimental bird station at Seebach, cats, weasels, martens, pole-

cats, house- and tree-sparrows, sparrow-hawks, goshawks, jays and magpies are considered extremely harmful, and rewards are offered for their capture and death.

RED AND GRAY SQUIRRELS

do great damage to bird life. They not only drive out the bird, but will gnaw the entrances to home-made bird boxes.

The former Secretary of the Game Commission in Pennsylvania, the late Dr. Kalbfus, wrote: "I know the squirrels introduced some years ago into Capitol Park, Harrisburg, have driven out the birds and prevented them from building in any of the trees. No wild birds nest anywhere in all these grounds except the English sparrow. The nesting robins, the orioles, the warblers, the woodpeckers and others that could be seen at any time before the squirrels came, are all gone, not one is left; demonstrating beyond question what squirrels can and will do, if given the opportunity."

All bird students agree to the damage done by squirrels, and the only remedy is to prevent them from becoming too numerous. Watch the squirrels on your grounds. The red squirrel is much worse than the gray.

I have seen the red squirrels time and again

rob the nest of birds at Buck Hill Falls, Pennsylvania. Squirrels should not be introduced in parks where they increase out of all proportions. Nevertheless there is no excuse in exterminating them.

The chipmunk usually molests only the birds that nest on the ground.

RATS AND MICE

do more damage to bird life than is generally supposed. Rats are great climbers and they reach the highest nests and nest-houses and kill the birds and their young. All birds that breed on the ground, especially the water-birds, suffer greatly from rats and mice. Rats are known to carry disease germs, and they frequently start fires. A female begins to breed when four months old, and breeds three or four times, with an average of ten to a litter. There are now excellent preparations made to destroy rats and mice, and our bird lovers should use them at once.

DOGS

running at large, do much damage to birds—in fact, next to the damage done by cats. In a suburb near Philadelphia, yelping hounds have driven many of the native birds away; wrens, tits and

meadowlarks being the greatest sufferers. Birds that nest low are easy prey to these animals, and laws should be made and enforced, to make owners keep their dogs at home. One of my friends who made a close study of the injury done by dogs to bird life says that the damage they do is almost as much as that done by the cat.

SNAKES

There are many snakes that are valuable to mankind, but some species are destructive to bird life. Birds are deadly afraid of snakes, and if near one, seem to lose their power to escape. Most of our country is now free from poisonous snakes, but there are still enough to cause havoc among birds.

At our Wallops Island Sanctuary in Virginia, the snakes were very destructive to the rails and red-winged blackbirds. One snake we caught had swallowed two eggs and was just about to swallow the third when Dr. Warren shot him.

CATS

Mr. Shaler says: "The cat is the only animal that has been tolerated, esteemed and, at times, worshiped, without having a single distinctive valuable economic quality. It may be, in a small

way, serviceable in keeping in check small rodents which are the self-invited guests of man." Now that is rather a strong statement, but after studying the question thoroughly, we are ready to agree that the cat is one of the worst enemies of bird life.

Professor Forbush, of Massachusetts, authentically states that the mature cat in good hunting grounds kills on an average of fifty birds a year. Mr. Dike showed a photograph of a cat that killed, in one year, fifty-eight birds, including the young in five nests. In New Zealand, some of the islands that formerly teemed with bird life are now without a bird, since the introduction of cats.

Cats are only half-domesticated, nocturnal, good climbers, leapers, very quick, and they easily go back to a wild condition. It has been estimated that in New York State alone 10,000 cats are compelled to find their own living.

John Burroughs, the great writer and naturalist, says: "Cats probably destroy more birds than all other animals combined." And the late Mr. Dutcher, of the Audubon Society, wrote: "The wild house-cat is one of the greatest causes of bird destruction known." These are opinions of men who know.

I do not believe in persecution, but the wild house cat should be destroyed. Well-fed cats,

trained to catch mice and never fed from the table, may not bother the birds, although most cats quiver when a bird flits across their vision.

In some localities they are trying to pass a law compelling all cats to be belled, so as to save the birds. The best remedy I have ever seen was the suggestion of Laura Sheldon, in the *New York Times*, that "it is imperative to bird protection that all cats be licensed and all owners compelled to pay a fine for every bird destroyed." If it is a question of cats or birds, I hope you vote for birds.

In the *National Geographic Magazine* there was an article on "A Cruise Among Desert Islands," and it described the island Guadeloupe. This island was visited by Dr. Edward Palmer in 1875. Dr. Palmer said that the birds were so abundant and so tame that he called it "The Isle of Dreams." Lately this island was again visited and the writer states the following:

"Either the goat ranchers or the soldiers liberated house cats which promptly turned to wild cats and proceeded to subsist on the bird life of the island. They have been the direct cause of the disappearance of most of the birds and we saw evidences of their depredations in the form of loose feathers and wings at every landing we made.

"House mice were also introduced in the same

manner and have completely overrun the island. One might think that the cats would kill the mice very promptly, but the birds seem more to their liking.

"The cats will undoubtedly exterminate practically all the birds of the island in the next few years; there seems to be no practical method of preventing this ornithological catastrophe."

THE BOY AND THE MAN

Many people do not know that all song and insectivorous birds are protected and it is against the law to kill them.

In a public park in Philadelphia, a robin was busily engaged in eating larvæ from a tree, when a boy about fourteen, deliberately killed him with a stone from a sling-shot. Boys with sling-shots and air guns destroy thousands of birds annually, and it is on account of lack of proper training in the homes and schools. Our young folks should be taught to respect life in all forms, and especially the great value of insectivorous birds to all mankind. Without birds, there would be no vegetation; insects would increase beyond all control.

There are sportsmen and sportsmen. We know some that are true sportsmen; others that simply kill for the sake of killing. Anything that is alive

seems to arouse in them the spirit of destruction. Some men kill through ignorance. They do not know the economic value of birds. Mr. William T. Hornaday states that the dead bodies of forty-three valuable insectivorous birds were taken from two foreigners in the suburbs of New York City. In Connecticut twelve robins, three jays, three flickers, two thrushes and one finch were found on another foreigner. The birds were intended for a New York cafe. Thousands of robins are caught yearly by horsehair snares. In "*Our Dumb Animals*" a photograph was shown of four robins caught in one snare in Massachusetts.

Up to the passage of the Weeks-McLean Bill in March, 1913, the robin was legally being killed as game in seven states. The bob-white quail is our greatest destroyer of seeds of noxious weeds, yet the species will soon be extinct if means are not taken to protect them.

Quail are in constant danger from the time they are hatched. The nest, being on the ground, the young are very apt to be destroyed by a prowling cat, or other carnivorous animal. If quail live to be full grown, they must watch out for hawks during the day and from nocturnal mammals that prey upon them at night.

In deep snow, they may be covered with snow,

and if sleet follows, forming a crust, they are trapped and freeze. This, with the lifting of game laws, shows how little chance they have.

The passenger pigeon and the Eskimo curlew are extinct, and the shore-birds will soon be exterminated. It is time for all to take a hand and prevent the slaughter. Laws will help, but education is better. It is not enough simply to prevent their destruction, but they should be studied so as to increase their number.

KNOWN ENEMIES OF BIRDS

Here are some of the enemies of birds as seen by myself and friends:

“My cat robbed over fifty martin nests and killed many wrens before I got rid of it.” *J.R., Kentucky.*

“The blue jays here kill the young robins and drive the old ones away.” *F.S., Maryland.*

“The English sparrows drive the chickadees away,” *M.L., Ohio.*

“The crows are the worst enemies of the song birds here.” *O.S.S., New York.*

“I think there ought to be a tax on cats if we really want to save the birds.” *E.M.N., Iowa.*

“The English sparrows drove away the blue-birds and barn swallows” *P.W., New York.*

"A red squirrel destroyed a nest of young robins, which were in a nest near the barn."

B.M., Minnesota.

"The cats are very troublesome here and many nests have been destroyed by them. Many birds have also been killed by drinking water from ponds that had been sprayed with kerosene to kill the mosquitoes." *J.G.W., New Jersey.*

"A cat killed a mother wren and her three young. She had built in a can. A bluebird built in one end of a box here and a martin in the other end. The middle room was unoccupied."

R.P., Texas.

"An English sparrow went into a bluebird's nest and killed two of the young. The English sparrows also killed two catbirds." *R.S., Ohio.*

"The birds used to build their nests around our house but the cat killed the birds and they went away. We got rid of our cat and the birds are coming back." *L.M., Massachusetts.*

"Last year a bird built in my bird-house and a cat got after the young ones and ate them. We got rid of the cat and since then I have had no more bother." *P.C., Maryland.*

"I found that jay birds destroy the nests of the song birds, and also actually kill a great many young birds just after they are hatched. I have just learned from a great many sources that they have about cleaned up the pecan crop in this

neighborhood; they take the whole nut and fly away with it, but we can never find where they eat the nuts." *W.M.P., South Carolina.*

BIRDS MEN HAVE EXTERMINATED

The passenger pigeon, the great auk and the Labrador Duck have been exterminated by man.

The heath hen, Eskimo curlew, whooping crane, trumpeter swan, ivory-billed woodpecker and the paroquet are nearly gone.

The prairie chicken, snowy heron, wild turkey, upland plover, quail, wood-duck and many game birds are now scarce.

The slaughter of eagles in Alaska is due to the working of a bounty system which was established in 1917. From that year until 1923 a bounty of fifty cents was paid on 17,816 eagles. In 1923 the bounty was increased to one dollar and under the additional price offered, 23,996 eagles have been killed. The records show that during the period from 1917 to September 1926, bounties have been paid by the Territory of Alaska on 41,812 eagles. It was pointed out that in all probability, this does not represent the total number killed, as usually one out of every four shot escapes to die a lingering death.

This bounty was paid at the instance of the Salmon Fisheries who complained that the eagles

were destroying the salmons. If the eagles are not soon protected, they also will become extinct.

The heath hen is particularly noticed as one of our various birds to disappear under civilization, or by the increase of its enemies. There is said to be only one heath hen left in the world (1929), and it is on Martha's Vineyard Island off the Massachusetts coast. This bird was once the rival of the ruffed grouse and quail, as New England's most numerous game bird.

The heath hen is a light reddish brown above, barred with black and buff. Underneath it is a rusty white with brown. There are tufts of black feathers at the sides of the neck and on each side is an orange air-sac and over each eye a small comb. They nest on the ground.

At one time it was thought that the heath hen would be the future game bird in New England and our other states. It fell an easy prey to the hunters and to predatory animals. As the bird flies in a very straight line, it is an easy target.

QUESTIONS ON THE ENEMIES OF BIRDS

1. Are birds pursued by many enemies?
2. Do different species of birds attack each other?
3. Give examples of one species of bird fleeing from a different species.
4. How does Nature control bird life?

5. Which animals are destructive to bird life?
6. Give a list of birds that are known to be destructive to our insectivorous birds.

ANSWERS TO QUESTIONS ON THE ENEMIES OF BIRDS

1. Birds have many enemies. It is only by the power of flight that they escape. Even with this power, many are killed. The life of most birds is short.
2. Birds not only have man and animals to fight against, but they must also fight against birds of different species.
3. Water-fowl fly to the water and dive to escape the eagle and hawk and fly to the land to escape the pike, shark, or alligator. Bluebirds and other similar birds fly to the thickets to escape the hawks and to the trees to escape from the cat.
4. Nature correctly controlled the balance of bird life, until man stepped in. Eagles, large hawks and owls fed on crows ; crows kept in check the robins, but hawks and owls also preyed upon robins if robins were in great numbers. Crows, hawks and owls also kept in check the blue jays that ate the eggs and young of warblers, titmice, vireos and other birds. This preserving the balance is far more complicated than what you have just read, but it gives an idea of how Nature acted. Any albino or weak bird is almost sure to fall prey to a stronger one of another species. Under the wise guidance of Nature, checks on the increase of birds were necessary. It is only when man unwisely steps in that we get into trouble.
5. Weasels, foxes, raccoons, minks, skunks, red and

gray squirrels, chipmunks, rats, mice, dogs and snakes are all destructive to bird life.

6. The goshawk, sharp-shinned hawk, Cooper's hawk, pigeon hawk, and all the owls (to a certain extent), crows, jays, magpies, shrikes and the English sparrow. The owl family should be protected as they do much good, but the four hawks mentioned should be controlled, but not exterminated. They are some of the most beautiful examples of bird life that we have.

BOUNTY LAWS

I am against bounty laws, first, last and all the time. I am also against organized slaughter of any kind.

I do believe, though, that the right of a farmer should be recognized and he should be allowed to protect his crops from any bird or animal that has abnormally increased on his farm.

When the economic status of any bird is questioned, and it has not been studied in detail, the matter should be turned over to the Biological Survey, Department of Agriculture, Washington, D. C., and upon their findings we should stand squarely whether it agrees with our opinions or not.

There are birds that are destructive and they should be reduced in numbers until the proper balance of bird life is secured; but to put a price

upon their heads not only means extermination, but frequently fraud and the killing of other birds. Massachusetts tried out the bounty system thoroughly during many years, and according to Professor E. H. Forbush, State Ornithologist, "The people came to the conclusion that such laws were worse than worthless."

There are many cases where it is necessary to control the enemies of song, insectivorous and game birds, but in England, where game preserving has reached the highest development, it is positively stated that scientific and practical game-keepers have reached the conclusion that it does not pay to exterminate any bird. It has been proved that when hawks and owls were wantonly slaughtered by the establishing of bounties, serious losses to farmers resulted from the ravages of field mice and other small rodents. Dr. C. Hart Merriam of the U. S. Department of Agriculture, has estimated that in offering a bounty on hawks and owls, which resulted in the killing of over 100,000 of these birds, the State of Pennsylvania sustained a loss of nearly \$4,000,000 in one and one-half years.

The late Dr. B. H. Warren of Pennsylvania said that it was a grave mistake to pass bounty laws, but he believed in allowing farmers to protect their crops and the beneficial birds by judicious shooting.

Plain common sense (a rarity) should be developed in the handling of this subject. Game birds should be protected by shorter hunting seasons, by requiring smaller bags, by prohibiting the sale of birds, and by the establishment of Liberty Bell Bird Club sanctuaries, or other bird sanctuaries, where all song, insectivorous and game birds can nest in security.

QUESTIONS ON BOUNTY LAWS

1. Are bounty laws that are passed to reduce the number of any species, good or bad?
2. Should farmers be allowed to protect their crops from birds that have abnormally increased and are doing harm?
3. What is the best way to determine the status of a bird?
4. Should we abide by their decision?
5. What does Dr. C. Hart Merriam believe Pennsylvania suffered in money value by the bounty laws against hawks and owls?
6. How should game birds be protected?

ANSWERS TO QUESTIONS ON BOUNTY LAWS

1. Bounty laws are considered a grave mistake by all thoughtful ornithologists.
2. Farmers should be allowed (on their own farms) to protect their crops, but it should be done wisely and thoughtfully, taking into consideration both the good and bad done by that particular bird.

TRAGEDY AND A BIG BILL



A TRAGEDY

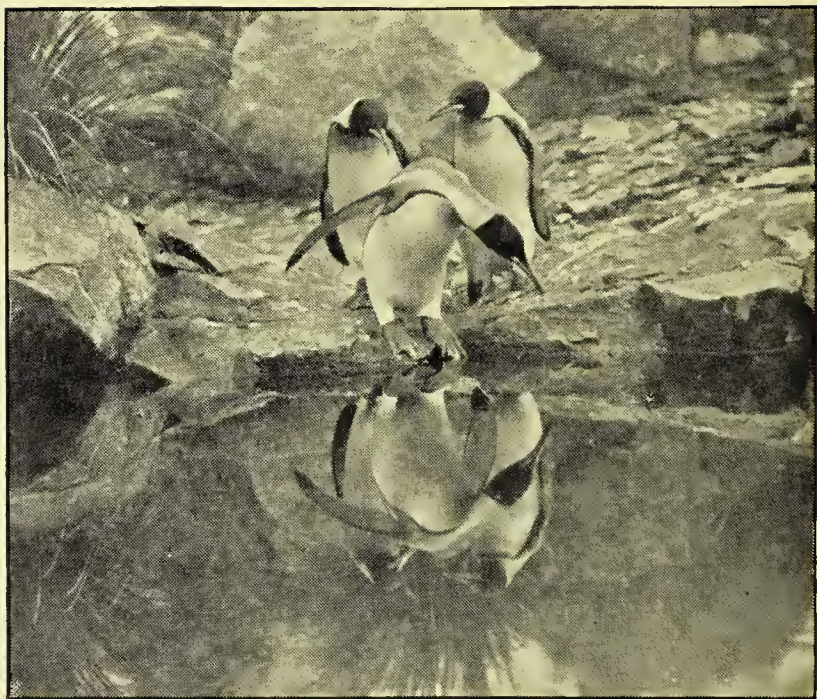
Nature, at times, is very, very cruel. Here we have a photograph sent in by our friend C. B. Messersmith, of New York. It shows a male golden-crowned kinglet that flew into a cocklebur and became so entangled that when our friend found the bird, it was dead. If the bird had been found before it had struggled so hard, it could have been saved, but unfortunately no one was near at hand



© Underwood & Underwood

All bills are troublesome. From the ones Congress is struggling with to the ordinary every-day store bill. But here is a bill, on the Goliath Heron, that with one jab could kill a man. This bird stands about four feet in height, and is now an interesting inmate of the London Zoo

THE PENGUIN



© Mortimer & Batten

The penguin is one of our most interesting birds. They are found in the Antarctic. Here is one about to take a dive. This photograph is practically perfect in every respect



BIRD SANCTUARIES



Charles P. Shoffner, with school children from the vicinity, dedicating Willow Grove Park, Pa., as a Bird Sanctuary

The inauguration of the first feeding-stations and bird refuge-houses in the Parc Monceau, in Paris, France



© Herbert Photo

BIRD SANCTUARIES



Dr. B. H. Warren and Mr. Shoffner with a cartload of bird-houses at Wallops Island Sanctuary

The Russians are realizing that they must have more birds, and are educating their children in the conservation of their feathered friends. "Bird Day" in Moscow was celebrated on March 27, while there was still much snow on the ground. Boys and girls went to the parks and forests with bird-houses which they had built at school, and fastened them on the trees for the birds. Good work, say we



© Herbert Photo

3. When the economical status of a bird is questioned, it is best to refer it to the Biological Survey, Department of Agriculture, Washington, D. C.
4. We should absolutely abide by the decision of the Biological Survey as to the status of any bird. They consider the question from all angles and are just.
5. Dr. C. Hart Merriam estimated that the state of Pennsylvania sustained a loss of nearly \$4,000,000 in a year and a half by the operation of a bounty law on hawks and owls.
6. Game birds should be protected by a shorter hunting season, limited bags, prohibiting sale of birds, and the establishment of bird sanctuaries.

CHAPTER XXX

OWLS

IF gophers, mice, rats and squirrels had full power, they would soon overrun this land. As it is now, they eat millions of dollars' worth of food products yearly.

The owl's business in life is to take care of these pests, but like all other members of the bird family, we have destroyed them until there is only a remnant left. There are said to be about 200 different species of owls in the world, of which there are about twenty in North America.

Owls are especially built for their life work. Their eyes are different from all other members of the bird family. They are fixed in their sockets in such a way that the bird can look in different directions without turning its head.

The vision of an owl is very keen. Some owls have tufts of feathers above the eyes which can be raised or lowered. These are not ears, but serve merely as ornaments.

The ear-opening of owls is large, and it is said they can hear a mouse before it can be seen.

An owl appears larger than it really is as the feathers are so loose and fluffy. The feathers are soft and fringed with down.

The flight of an owl is noiseless, so you can see how well it is fitted to catch mice and rats.

The claws of an owl are pointed and very strong. They pierce a rat with little effort.

An owl strikes for the head of a rabbit and usually eats the head first. He tears his prey to pieces swallowing meat, bones and fur. The meat is absorbed into the stomach and the indigestible matter is formed into pellets and disgorged.

A young owl is a gormand and will eat almost his own weight in food daily.

Dr. A. K. Fisher, a good friend of mine, and an authority on hawks and owls, shows that a pair of barn owls in Washington ate 1,596 mice, 134 common rats, 54 shrews and 37 other mammals and birds.

Owls make peculiar sounds. The screech owl whistles and gives a quivering whimper. The great horned owl hoots and the barn owl screeches.

Owls differ greatly in size. The elf owl of Arizona is about the size of a sparrow. The snowy owl of the North is very large, being from 22 to 25 inches in length.

The only owls that do any great damage are the great horned owl and the snowy owl. All

others should be protected. They do, now and then, take a bird or so, but the good they do more than balances the harm. It is believed that the great increase of noxious rodents during the last five years is due largely to the killing of our beneficial hawks and owls. Do your best to protect them. Owls in your barns and orchards will do much good and little, if any, harm.

Try to correct the many mistaken ideas about hawks and owls. They are usually all classed as thieves and robbers, whereas the majority are the farmer's friends and spend their time destroying injurious insects and rodents. The hawks work by day, the owls chiefly at night, so that these two classes are practically working throughout the twenty-four hours.

A screech owl nesting in a bird-house brought its young, insects, fish, spiders, snails, reptiles, crayfish and some birds.

Dr. A. A. Allen, in "The Auk" in observing a pair of screech owls, wrote that they brought seventy-seven birds of eighteen species to their young in forty-five days. He believes that owls are a powerful factor in maintaining the balance of Nature but, from the standpoint of increasing insectivorous birds, they are an equally powerful menace. Nevertheless I agree with Dr. Witmer Stone and others that there is a limit to the number of birds that can live in a given area.

The owls help to maintain this and prevent overcrowding, possible epidemics, etc.

Personally, I believe that all screech owls do not eat as many birds as Dr. Allen has observed. Birds, like men and women, differ in their taste.

American Barn-Owl: Fifteen to eighteen inches. No nest is built; eggs are laid in hollows of trees, holes in banks or cliffs, in barns, steeples, etc. Eggs, 4 to 7, pure white. Food: meadow-mice, rats, beetles, shrews, and gophers. It commences to fly at sunset and works all night for the benefit of mankind. It has great economic value and should be protected by law.

Snowy Owl: Twenty to twenty-five inches; plumage, white, more or less barred with blackish. Nest on the ground in Arctic regions. Eggs, 4 to 7. Very destructive to bird life.

Barred Owl: Twenty inches. Nest, in hollow tree or in a deserted nest of a hawk or crow. Eggs white. Habitat, Eastern United States. Food: mice, shrews, weasels, moles, birds, insects, and now and then a chicken. In early twilight it flies very low, watching for mice. Protect this bird.

Screech Owl: Ten inches. This bird is dichromatic (having or producing two colors) and may be either red or gray in color. Nest, in natural cavities in trees, in boxes nailed to trees, or in dark corners in barns, etc. Eggs, 4 to 5, pure white in color. Habitat, throughout temperate

North America. Flight, smooth, rapid, protracted and noiseless. Its notes are tremulous and doleful. Food: mice, locusts, bugs, insects, lizards, spiders, scorpions, etc. The screech-owl is of double value to the farmer as it does not migrate. It does, at times, prove destructive to other bird life.

Short-Eared Owl (Marsh or Swamp-Owl): Female, fifteen inches, Male, twelve inches. Nest, on ground in marshy meadows. Eggs, 4 to 7, white, nearly round. Habitat, throughout North America. Food: almost exclusively mice. Should be protected.

Long-Eared Owl: Fifteen inches; ear-tufts conspicuous. Nest in an evergreen or in a crow's or hawk's nest. Eggs, 4 to 6 oval, white. Habitat, temperate North America. This bird is sociable and is found in parties of 12 to 20. Food: Field-mice and destructive rodents. This species is very serviceable to the farmer and horticulturist. Protect it.

Acadian Owl. Seven and one-half inches, smallest of our owls. Nest, in the hollow of a tree. Eggs, white, bluish tint. Voice is squeaky. During the day this owl hides in hollow trees or in piles of rock. Food: mice, grasshoppers, beetles and other insects. A beneficial species.

Great Horned Owl: Female, 22 inches. Male,

19 inches. Nest, in a hollow tree, among branches of a tree, or in a cleft of rocks. Eggs, 2 to 4, round, white. Flight, rapid, high and graceful; sails in large circles. Usual cry, "hoo, hoo, hoo, hoo-e," very weird and unmusical. Habitat, Eastern North America. It does not migrate. Food: chickens, turkeys, pheasants, birds, ducks, squirrels, mice and insects. It is generally destructive.

QUESTIONS ON OWLS

1. For what purpose was the owl created?
2. Do owls ever eat song and insectivorous birds?
3. Do the good the owls do over-balance the harm they do?
4. Which owl is known to be especially beneficial?
5. How many species of owls are there in the world?
6. How many species of owls are there in North America?
7. Does the size of owls vary?
8. Do owls seek their prey by day or night?
9. Are owls' eyes like other birds' eyes or like human eyes?
10. Is the hearing of owls acute?
11. Can you hear an owl flying?
12. How do owls capture their prey?
13. How do owls eat their prey?
14. Do owls eat only rodents and birds?
15. What does an owl do when frightened?
16. How does a long-eared owl try to hide?

ANSWERS TO QUESTIONS ON OWLS

1. The owl is a flesh-eater and his business in life is to prey upon destructive rodents such as rats, mice, moles and gophers.
2. Owls, at times, destroy many beneficial birds.
3. It is generally believed that owls should be carefully protected and that they do much more good than harm. There have been cases when an individual owl or a pair of owls were very destructive to bird life, but there are also prisons built to hold some men.
4. The barn owl is noted for the number of mice and rats it destroys.
5. There are about 200 species of owls in the world.
6. There are about 20 species of owls in North America.
7. There are little owls, big owls and medium-sized owls. The great snowy owl is from 20 to 25 inches in length while the elf owl is only as large as a sparrow.
8. Owls seek their prey from sundown to sunrise. They sleep by day and hunt by night.
9. An owl's eyes are different from those of other birds and also from human eyes. They are fixed in their sockets in such a way that they can look in different ways without turning their heads. Their sight is very keen.
10. It is said that the hearing of owls is so acute that they can hear a mouse before they see it.
11. The flight of an owl is noiseless, this is due to the peculiarity of their feathers which are soft and fringed with down.

12. Owls capture their prey by striking it with their powerful talons.
13. Owls have a peculiar way of eating. They tear their food to pieces and swallow meat, bones and fur. The indigestible matter is formed into pellets and later disgorged.
14. Owls not only eat great quantities of rats, mice and other rodents, but also eat insects, spiders, snails, reptiles, fish and crawfish.
15. An owl when frightened or disturbed will make a hissing sound and seem to expand to twice its normal size. Every feather is raised and the wings spread and are thrown backward.
16. All owls, if discovered, will remain perfectly quiet, but a long-eared owl will draw its feathers close to its body, erect the ear-tufts until it looks like a part of the tree.

CHAPTER XXXI

THE HAWKS

THERE are more mistaken ideas about hawks than there are about owls. Even the name "hawk" seems to have a peculiar effect on most people.

Hawks belong to the family "Falconidæ" which numbers about 350 species. They are strong birds and capture their prey on the wing by striking it with their sharp, curved claws. Their claws are the most deadly weapons possessed by any of the birds. Their bills are short and hooked.

The hawks that are injurious are the goshawks, pigeon-hawk, Cooper's hawk, sharp-shinned hawk and duck-hawk.

The red-shouldered hawk, the red-tailed hawk, and the sparrow-hawk eat enormous quantities of rats, mice, grasshoppers and injurious insects. The increase of noxious rodents during the last few years is caused by the wholesale killing of hawks and owls. A hawk will, at times take a chicken; but a chicken is small pay for the thousands of mice and injurious insects it destroys.

Goshawk: Male, twenty-two inches; female, 24 inches. Habitat, Northern and Eastern North America. Breeds in Northern United States and

Canada. Winters in Middle States. Nest, in trees, Eggs, 3 to 5, pale bluish-white. Flight, alternate periods of flapping and soaring. Food: Chickens and birds. Very vicious and destructive; should be reduced in numbers.

Sharp-Shinned Hawk: Male, eleven one-quarter inches; female, thirteen one-half inches. Habitat, North America in general, south to Panama. Nest, in trees. Eggs, 4 or 5, from bluish-white to cream-buff, distinctly spotted, blotched or washed with reddish-brown or chocolate. It soars comparatively little, is very daring, and feeds almost exclusively on birds and young chickens. It should be reduced in numbers.

Cooper's Hawk: Male, fifteen one-half inches; female, nineteen inches. Nest, generally in an evergreen tree. Eggs, 4 or 5, greenish-white, sometimes faintly spotted with brown. Food: chickens and birds. Most destructive of all hawks. It should be reduced in numbers.

Duck-Hawk: Male, sixteen inches; female, nineteen inches. Habitat, North America at large. Nest, on rocky cliffs. Eggs, 3 or 4, varying from creamy-white, heavily marked with cinnamon-brown, to pale reddish-brown more or less marked with shades of same color. Food: chiefly pigeons, birds, wild ducks and poultry. Generally considered injurious.

Pigeon-Hawk: Ten inches. Nest, in trees or

on cliffs. Eggs, 4 or 5, creamy-white, more or less heavily marked with reddish-brown or chocolate. Food: small birds, pigeons, grasshoppers and beetles. Generally considered an injurious hawk.

Fish-Hawk or American Osprey: Twenty-five inches. Nest, bulky, on a large tree near water. Eggs, 2 or 3, yellowish-white, covered with brown blotches. Habitat, North America from Hudson Bay to Northern South America. Food: Generally fish, at times reptiles and batrachians. This hawk does no harm and should be protected.

Red-Shouldered Hawk: Male, eighteen to twenty inches; female, 21 to 23 inches. Habitat, Eastern North America, west to Texas, south to Gulf coast and Mexico. Nest, in trees about 50 feet from the ground. Eggs, 2 to 6, white to pale-yellow more or less smeared, blotched or spotted with reddish-brown. Flight, heavy and deliberate; much given to soaring in circles at a great height. Will sit very still on tree watching for mice. Food: field-mice, rats, frogs, snakes, grasshoppers, insects and caterpillars. This hawk is very beneficial to the farmers. More than 50 per cent. of its food is field-mice. Protect this bird.

American Sparrow-Hawk: Male, ten inches; female twelve inches. Nest, in a hole in a tree.

Eggs, 3 to 5, variable in color, usually pale reddish-buff, marked all over with reddish-brown. Habitat, all parts of North America. Flight, hovering in the open, and dropping to the ground slowly for its food. Its note is "killee, killee, killee." Food: field-mice, grasshoppers, crickets, beetles, caterpillars, spiders, lizards, snakes, gophers, locusts, etc. This is a beneficial bird and should be protected.

Red-Tailed Hawk: Male, twenty inches; female, twenty-three inches. Nest, in high trees, built of sticks and twigs; very bulky. Eggs, 2 to 4, dull or rusty-white, marked with brown spots or purplish dark-brown blotches. Habitat, Eastern North America, west to the great plains: Flight, circling in the air and making a swift rush to the ground for its prey. Food: mice, squirrels, snakes, grasshoppers, shrews, beetles, and occasionally a bird or chicken. Its principal food is mice, which are eaten in tremendous numbers. This bird should be protected by the farmer, but on account of its habit of now and then taking a chicken, its good habits are forgotten. All authorities agree that it should be protected.

Rough-Legged or Black Hawk: Male and female, twenty-two inches. Nest, on large trees or shelves of rock. Eggs, 2 or 3, dirty-white, blotched with reddish-brown. Habitat, all of North America north of Mexico. Breeds north

of United States. Flight, rather sluggish. Food: moles, mice, lizards, weasels and insects. A valuable bird and should be protected.

Marsh-Hawk: Male, nineteen inches; female, twenty-two inches. Nest, on ground in marshes. Eggs, 4 to 6, pale-greenish or bluish-white, at times blotched with buff or brownish. Habitat, all North America. Food: mice, small mammals, reptiles, insects and ground-squirrels. Generally good, but did much harm at Wallops Island Sanctuary, Virginia.

QUESTIONS ON THE HAWK

1. Are there many mistaken ideas about the hawks?
2. Are all hawks beneficial?
3. What is the food of hawks?
4. How do they capture their prey?
5. Are hawks especially built for their work?

ANSWERS TO QUESTIONS ON THE HAWK

1. There are more mistaken ideas about the hawks than about any other bird.
2. There are a few hawks that do more harm than good. They are the goshawk, pigeon-hawk, Cooper's hawk, sharp-shinned hawk, and in some places, the duck hawk.
3. Hawks eat rats, mice, insects, reptiles, fish, and at times, birds.
4. Hawks capture their prey by striking it with their sharp, strong, curved claws.
5. Hawks are noted for their strong flight, powerful claws and sharp, hooked bill which they use to tear their prey to pieces.

CHAPTER XXXII

QUESTIONS ON OUR NATURALIZED FOREIGNERS

1. When was the English sparrow first brought into this country?
2. Were more brought in later?
3. Why were they brought in?
4. Did they destroy the measuring worms?
5. Did the English sparrows rapidly increase in number?
6. Is the English sparrow useful to-day?
7. What harm does it do?
8. How is the best way to reduce the English Sparrows in numbers?
9. Are English sparrows good to eat?
10. When was the starling introduced into the United States?
11. Did they increase rapidly?
12. Describe the starling.
13. Give an account of its food and habits.
14. Is the starling a protected bird?
15. Which other birds that are now widespread, have been brought into the United States?

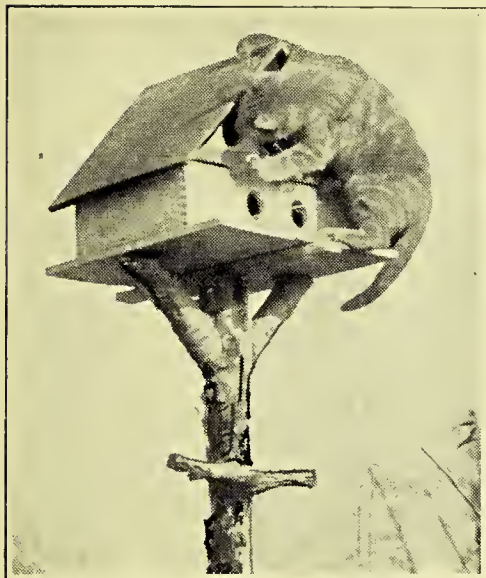
ANSWERS TO QUESTIONS ON OUR NATURALIZED FOREIGNERS

1. The English sparrow was first brought into this

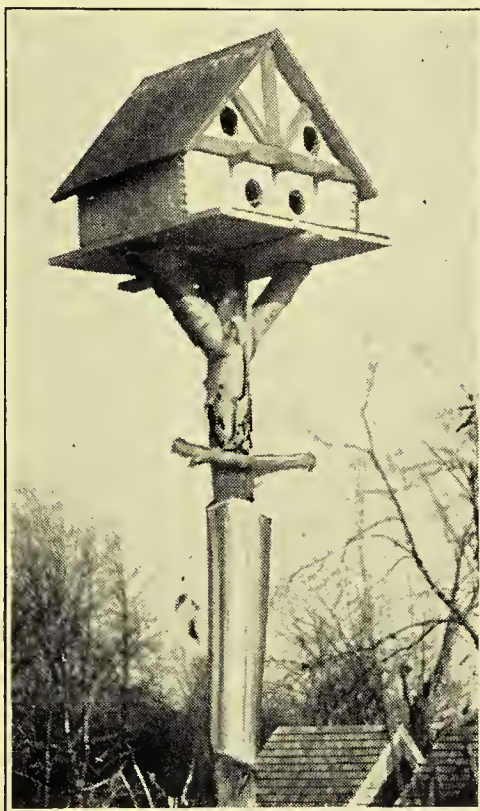
country in 1850. Eight pairs were imported by the Brooklyn Institute.

2. From 1850 to 1870, both corporations and individuals brought English sparrows into this country and the city of Philadelphia once imported 1,000.
3. They were brought in to destroy the measuring worms which were prevalent during that period in our cities.
4. The English sparrows are said to have banished the measuring worms from the cities and did some good by destroying such destructive weed seeds as crab grass, dandelions, etc. Some folks believe the epidemic died out and that it was not due to the efforts of the English sparrow.
5. The English sparrows increased very rapidly and soon spread all over the United States.
6. It is generally conceded by our Government and all ornithologists that to-day the English sparrows do more harm than good, and they are such a pest that the increase of other birds is in inverse ratio to the decrease of the English sparrows.
7. The United States Biological Department says: "The English sparrow among birds, like the rat among mammals, is cunning, destructive, and filthy." It destroys fruit buds and flowers of cultivated trees, bushes and vines; eats valuable vegetable seeds, damages wheat and other grains, has no song, but is very noisy and quarrelsome. It defiles buildings and ornamental trees, etc., with its excrement and bulky nests, and reduces the number of some of our most useful native birds by destroying their eggs and young, and

PROTECTING NESTS



BEFORE



AFTER

My friend, W. D. Brinckloe, got a sheet of galvanized iron roofing, cut a piece about eighteen inches long, and wrapped it around the pole, nailing it tightly, taking care to set it so high up that the cat could not make a leap from the ground and catch the pole above it. You know, a cat climbs by digging her claws into the pole, exactly like a telephone lineman does with his climbing-irons; she can't get up any very hard smooth surface, like tin or iron. Some folks use old iron pipes for bird-box posts; but wrapping a wooden post with tin or galvanized iron will keep the cats down just as well

CROWS



Corn in shock near West Chester, Pa., destroyed by crows



Saint—



or Sinner?

(For report on Crows see page 175)

HAWKS
(See page 206)



GOSHAWK



COOPER'S HAWK

AMERICAN



SPARROW HAWK



RED-SHOULDERED HAWK



RED-TAILED HAWK

HAWKS



PIGEON HAWK



SHARP-SHINNED
HAWK



ROUGH-LEGGED
HAWK



FISH HAWK

by stealing their nesting places. In its favor nothing can be said except that in a small way it eats weed seeds and in exceptional cases, has been found useful as a destroyer of insect pests. When this bird proves useful, it is entitled to some protection; but, as a whole, the evidence against the English sparrow is overwhelming, and if we wish to increase our native song and insectivorous birds, the English sparrow must be destroyed rather than protected.

8. When the English sparrow is to be reduced in numbers, see that it is done by men and not by children. Children should never be trained to shoot, poison or trap birds. This work would have a bad influence upon the children's nature. Children, not knowing the difference, might frequently kill valuable native birds, thinking they were English sparrows. The means advocated by the Government for the destruction of the English sparrow consists of: (1) destroying their nests and eggs at intervals of ten or twelve days during the breeding season. (Be sure no eggs of other birds are taken); (2) catching the birds while nesting by means of nets; (3) shooting with No. 10 shot (care should be used, as native birds may be in the flock); (4) trapping. The last is really the best, for if other birds get into the trap they can be released. By continual warfare, the number of English sparrows can be greatly reduced.
9. English sparrows here should be utilized for food as they are in the Old World. The flesh is very good, and although small, their numbers compensate. To dress, cut off the legs, the wings at the

outer joint, and the neck close to the body, strip off the skin, beginning at the neck; make a cut and remove the viscera. They may be cooked by any methods employed for reedbirds or quail. When broiled, buttered and served on toast, they are very fine.

10. Several attempts were made to introduce the starling into this country before the success crowned the efforts of Mr. Eugene Schieffelin in 1890.
11. It was not long before the starlings spread through the New England states, New York, Pennsylvania, New Jersey, and now they are rapidly traveling southward and westward.
12. Starlings are eight and one-half inches long. Color, metallic green and purple, heavily spotted above and below with buff or white. They can easily be recognized by the short square tail and yellow bill. Eggs, four to six, pale blue unspotted.
13. The starling is markedly insectivorous, especially in summer, and preys upon many noxious varieties. In this respect it might be classed among our useful birds. So far as is known, it has not proved destructive to grain crops, but it is known to be very fond of small fruit, and as it associates in large flocks, it is likely to become a pest to the orchardist as it has in England. In addition, it prefers tree cavities, boxes, or recesses in buildings for nesting sites, and thus is brought in direct competition with certain of the useful native birds, more particularly the bluebird, purple martin, white-bellied swallow, house wren and flicker. Last year the starlings occupied my martin house and all efforts to get them out were futile.

14. The starling is not a protected bird. It is generally believed it will become almost as much, if not more, of a nuisance than the English sparrow.

15. Golden and silver pheasants and ring-neck pheasants, imported from China, are now rapidly increasing. In the East, English pheasants have been imported and are thriving. More than 85,000 Mexican quail, the largest number ever imported into the United States in one season, were brought in from Mexico under permits issued by the department during the season which closed on April 30, 1927, reports the Bureau of Biological Survey. The birds were brought in at Brownsville, Laredo, and Eagle Pass, Texas. Most of them were shipped to Oklahoma, Alabama, Georgia, Kentucky, Illinois, Texas, South Carolina, Pennsylvania, Missouri, Maryland and Kansas.

CHAPTER XXXIII

HOMES FOR BIRDS

ONE of the best ways to attract birds and to increase the bird population on a given area is to make and put up safe and comfortable houses in which they can build. Bird-houses were evidently made by man in the far distant past, as uncivilized tribes seem to have had great ability to tame wild creatures.

In Asia Minor, doves and pigeons were used for carrying messages, and no doubt but that houses were made for them.

In Japanese temples there are shelves for swallows and the Brahmans of India had feeding towers with nesting places on them for the birds.

The Indians of our own country hung up gourds for the martins, and in our southern states this custom is still followed.

Civilization has decreased the natural nesting places of birds and our feathered friends are more attracted to man-made houses.

The following forty-five species, according to

the Biological Survey, have nested in bird boxes or on supporting devices built for them:

Mountain bluebird	English sparrow
Western bluebird	House finch
Eastern bluebird	Purple grackle
Robin	Orchard Oriole
Chestnut-backed chickadee	Starling
Mountain chickadee	Phoebe
Carolina chickadee	Ash-throated flycatcher
Black-capped chickadee	Crested flycatcher
Plain titmouse	Red-shafted flicker
Tufted titmouse	Yellow-shafted flicker
Red-breasted nuthatch	Golden-fronted woodpecker
White-breasted nuthatch	Red-headed woodpecker
Brown creeper	Downy woodpecker
House wren	Hairy woodpecker
Bewick wren	Screech owl
Carolina wren	Saw-whet owl
Brown thrasher	Barn owl
Violet-green swallow	Sparrow hawk
Tree swallow	Mourning dove
Barn swallow	Wood duck
Cliff swallow	American goldeneye
Purple martin	Hooded merganser
Song sparrow	

BIRD-HOUSES YOU CAN BUILD

When I say you, I mean *you*—not a skilled carpenter nor mechanic, but just the ordinary bird-lover who wants to build a house for his or her feathered friends.

Now for the houses. After six years of close study at Liberty Bell Bird Club Bird Sanctuaries, we have proved the following: (1) Putting up bird-houses is the best way to increase the bird population. (2) Birds are not fussy about their homes. They simply ask for comfort and safety. (3) Which way the houses face make no difference. (4) Perches are not necessary. (5) Roofs should be tight, but floors need not be. (6) Houses, if ventilated, should have two small holes bored in each side near the roof. Be careful of drafts. (7) Entrance holes should be near the top, in front. (8) When cats are troublesome, use a tin guard around tree or pole.

MATERIAL TO USE

Wood is by all means the best building material, and rough slabs, with the bark on, make artistic and good homes.

Many of my houses are made of Jersey cedar with the bark on. Cypress, pine or yellow poplar are all good woods to use. Never use tin cans for houses unless they are in very shady places. These become very hot if the sun beats down upon them. At the Wallops Island Sanctuary, the late Dr. Warren and I took out over a dozen young wrens which had been roasted in tin-can houses. If you can get it, cork bark makes ex-

cellent houses. The bark is steamed, then cut and nailed. I never had a cork-bark house vacant.

PAINTING BIRD-HOUSES

Martin houses should be painted white or light gray. The pole can be black. Rustic houses, of course, need no paint and are generally preferable to painted houses. If plain boards are used, a neutral shade of green or gray is best, especially for those houses that are to be fastened on trees. A soft brown color is also used that blends well with almost all surroundings.

CLEANING BIRD-HOUSES

A wide difference of opinion is found in regard to this subject. A last government report states that each spring, before the birds return from the South, all filth and litter should be carefully removed from bird-houses. A well-known bird lover and manufacturer of bird-houses positively says that bird-houses should not be touched, and asks the question, "Who cleaned out their nests before the advent of man?" There can be no question but that woodpecker's houses should be let alone. Unless the bird-houses have been fouled by the English sparrows, or contain nests of bees or squirrels, let them alone. Houses that contain

old nests give a certain amount of confidence to the birds that are out hunting sites. A man in New Jersey states that for 20 years flickers built in the same cavity in a hollow tree and it was never cleaned out once by man. Robins have been seen repairing an old nest, instead of starting to build a new one.

Houses that open easily for cleaning purposes are generally of great temptation to those whose curiosity is greater than their self-control.

VENTILATION OF BIRD-HOUSES

Ventilation must be handled with caution. Drafts kill young birds, and if the means for ventilation will admit the rain, the nestlings will be drowned.

Usually the entrance hole will admit all the air necessary. As stated, I believe if ventilation is desired, bore small holes just beneath the eaves, never lower than the entrance, Make joints tight.

A small drainage hole in the middle of the floor will no no damage as the nest covers it.

DIMENSIONS FOR BIRD-HOUSES

This list was prepared by the U. S. Department of Agriculture and could not be better. Any

style house can be made and the general dimensions followed.

	Floor of Cavity	Depth of Cavity	Entrance above floor	Diameter of en- trance	Height above ground
Species	Inches	Inches	Inches	Inches	Feet
Bluebirds	5 x 5	8	6	1½	5-10
Robin	6 x 8	8	(1)	(1)	6-15
Chickadees	4 x 4	8-10	6- 8	1⅛	6-15
Titmice	4 x 4	8-10	6- 8	1¼	6-15
Nuthatches	4 x 4	8-10	6- 8	1¼	12-20
House wren	4 x 4	6- 8	1- 6	⅞	6-10
Bewick wren	4 x 4	6- 8	1- 6	1	6-10
Carolina wren	4 x 4	6- 8	1- 6	1⅛	6-10
Violet-green swallow.	5 x 5	6	1- 5	1½	10-15
Tree swallow	5 x 5	6	1- 5	1½	10-15
Barn swallow	6 x 6	6	(1)	(1)	8-12
Purple martin	6 x 6	6	1	2½	15-20
Song sparrow	6 x 6	6	(2)	(2)	1- 3
House finch	6 x 6	6	4	2	8-12
Starling	6 x 6	16-18	14-16	2	10-25

	Floor of Cavity	Depth of Cavity	Entrance above floor	Diameter of en- trance	Height above ground
Species	Inches	Inches	Inches	Inches	Feet
Phoebe	6 x 6	6	(1)	(1)	8-12
Crested flycatcher...	6 x 6	8-10	6- 8	2	8-20
Flicker	7 x 7	16-18	14-18	2½	6-20
Golden-fronted woodpecker	6 x 6	12-15	9-12	2	12-20
Red-headed woodpecker	6 x 6	12-15	9-12	2	12-20
Downy woodpecker..	4 x 4	8-10	6- 8	1¼	6-20
Hairy woodpecker ..	6 x 6	12-15	9-12	1½	12-20
Screech owl	8 x 8	12-15	9-12	3	10-30
Saw-whet owl	6 x 6	10-12	8-10	2½	12-20
Barn owl	10 x 18	15-18	4	6	12-18
Sparrow hawk	8 x 8	12-15	9-12	3	10-30
Wood duck	10 x 18	10-15	3	6	4-20

(1) One or more sides open.

(2) All sides open.

THE "FLIGHT" HOUSE

The "flight" bird-house is closely modeled after the woodpecker's nest. It has been found that many birds are quick to build in a deserted woodpecker's home. Use a branch or trunk of a tree with a good rough bark. The cavity can be bored and chiseled out from the top, and the entrance hole made; or the log can be sawed in half, the cavity made, and the two sections cemented or nailed together. Notice that the entrance hole slants upward. This prevents rain from entering.

The lower part of the cavity is enlarged bottle-shaped and ends in a pointed oval trough at the bottom. The inner walls should be uneven, so that the birds can cling to them. If the house is intended for woodpeckers or flickers, leave a few fine shavings on the bottom. Perches are really not necessary and may be omitted. The top can be removable, but see that the birds are not disturbed during the nesting period. The roof can slant as shown in the illustrations, or with the back higher, which is really preferred.

BRACKET HOUSE

*For Robins, Flycatchers, Brown Thrashers,
Phoebes and Swallows*

This house can be made from material with the bark on, or cut of plain boards. The back to be

fastened against a tree or house, is $5\frac{3}{4}$ inches wide and 12 inches to extreme top. The height from bottom of nest to point of roof is $8\frac{1}{4}$ inches. Base of nest, 8 inches wide by $7\frac{1}{2}$ inches in depth. The front corners are cut off, which adds to its beauty. The strip surrounding nest is $2\frac{1}{2}$ inches high. Each half of the roof is 6 inches by 6 inches, and is supported by the back board and an upright strip, $1\frac{5}{8}$ inches wide by $6\frac{1}{2}$ inches long, nailed to side of nest and to cross strip on underside of roof. This house can be nailed or wired to tree, eaves of barn or side of dwelling.

WREN HOUSE

An artistic little rustic house, and a great favorite with the wrens is shown on insert page. The diameter of entrance hole is 1 inch. It will also be used by bluebirds if hole is enlarged to $1\frac{1}{2}$ inches. Use lumber with a good rough bark. If perch is desired, fasten a little branch below the opening. It can be made out of smooth boards but the effect is not so good. Three sketches and a photograph of the finished house are shown so there should be no trouble in making it.

The back is a half-inch smooth board. The front is rustic $3\frac{1}{2} \times 6 \times 3\frac{1}{2}$ inches. The bottom and each side is $3\frac{1}{2} \times 4\frac{3}{4}$ inches. Roof can be of one piece on each side or several small strips fas-

tened on a half-inch smooth board. Each side of roof is $6\frac{1}{2} \times 8$ inches.

MARTIN HOUSES

If safety and comfort are provided the style of house is not important. Martins will occupy a fifty-room, \$100-house, or a soap box or barrel that has been roughly divided into rooms. Gourds hanging from poles often attract them. Here is a plan for an easily constructed ten-room house. This can be enlarged and decorated if desired.

Make the rooms 6 inches wide, 6 inches long and 7 inches high. The openings should be $1\frac{1}{2}$ inches above the floor. Size of openings, $1\frac{3}{4}$ inches wide and $2\frac{1}{2}$ inches high. The top can be rounded. Circular openings 2 inches in diameter. Build the base $\frac{7}{8}$ -inch oak or other hard wood. Sides, ends and roof of $\frac{7}{8}$ -inch poplar. Partitions can be of any variety of wood $\frac{1}{2}$ or $\frac{3}{4}$ inches thick. Around base and second floor have a $1\frac{1}{2}$ -inch porch. A small porch should be built under circular openings at the ends. The base, second and third floors will be $14\frac{5}{8}$ inches square. Two sides, each $14\frac{5}{8}$ inches base $\times$ $16\frac{5}{8}$ inches high. Ends, $16\frac{3}{8}$ base, $16\frac{5}{8}$ inches side; peak, $23\frac{5}{8}$ inches. First and second floor divided into four rooms each. Under roof divided into two rooms.

Let roof extend over house, $1\frac{1}{2}$ inches. Houses should be painted white; pole, black.

There is a difference of opinion about size of rooms, 6x6x6 inches quotes one man; another 8x8x8 inches. If conditions are favorable, size of room is not so important.

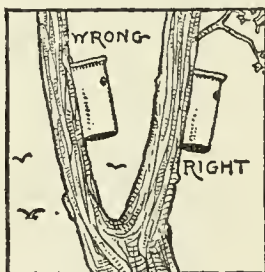
Illustrated on another page is a good bird-house very easily constructed. It is called the "wing" bird-house. Use $\frac{1}{2}$ or $\frac{3}{4}$ inch boards. Perches are not necessary and, where English sparrows are troublesome, should always be omitted. The roof can slant either toward the front or the back. I believe the best way is to make the back higher.

HOW AND WHEN TO HANG BIRD-HOUSES

Bird-houses may be put up any time in the year, but the best time is before the spring migration in March, April and May and in September, October and November. The advantage of putting them up in the fall is that the houses become weather-stained and the winter birds use the nests for shelter. More birds would remain with us if shelter and food were provided.

After the bird-houses are built, it is necessary to have them hung properly, or the birds will not use them.

Bird-houses, when fastened to a side of a building or a tree, should always be hung vertically or with the upper part projecting a little in the direction of the opening. If this is not done, the rain will beat in and drown the young birds.



A shady place is best; never fasten the house so that the hot sunshine can strike the opening. To prevent cats from getting the birds, wrap tin or zinc around tree or pole in the shape of an inverted funnel, or run a half dozen or more strands of barbed wire around the support. In some places where cats and red squirrels are troublesome, the houses can be supported by iron rods or tubing. Training a thorny Dorothy Perkins rose-bush, or any thorny bush around a tree, will also keep these pests away. I have also used sticky fly-paper around the trunk of a tree or a pole.

Orchards are always fine places for bird-houses. Hang up the houses where they will be hidden by overhanging branches. In woods, be-

gin about four feet from the edge and gradually introduce them into the interior. Woodpeckers like homes near cattle pastures, marshy lowlands, in orchards and in woods.

Generally, only one house for a particular breed, on a tree, is advisable, and houses should be hung about 30 feet apart. If food is plentiful, more boxes can be added. Some birds, such as martins, swifts, doves, swallows, etc., like to live in colonies. Birds of different species usually live peacefully together, and two bird-houses for two different varieties can be on the same tree.

CHAPTER XXXIV

BIRD SANCTUARIES

EVERY community should have its Bird Club, and every district should have a protected plot containing a bird bath, drinking-fountain, food houses, lunch-counters, bird-houses and safe thickets for nesting.

A lack of opportunities for safe nesting is realized by all bird lovers. There are now very few hedges, and most of the streams and creeks which were bordered with rushes and vines are dried or filled up. To make up for this deficiency, have a space set apart especially for the birds.

If a small creek flows through it, so much the better. Plant sunflowers, Japanese buckwheat, broom corn and hemp on the bare places. Plant trees, bushes and vines as suggested under "Trees, Shrubs and Vines." Let everything grow wild.

Put up bird-houses of various kinds, have feeding boxes, lunch-counters, and several bird baths. Have a good hedge around this sanctuary, and

OWLS
(See page 198)



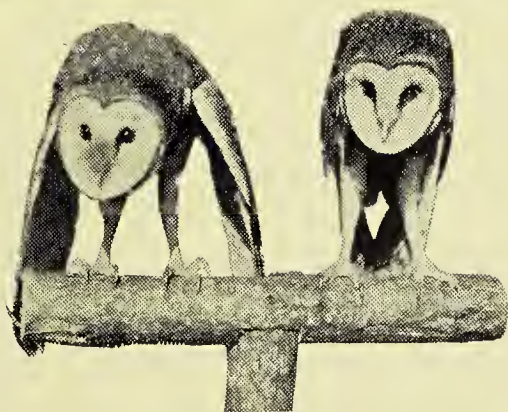
BARRED OWL



ACADIAN OWL



SCREECH OWLS



BARN OWLS

Under the nest of this pair of Barn Owls were found 3,000 skulls of mice, rats and gophers

OWLS



THE SNOWY OWL

A big stranger to many. He is often destructive to other birds. This specimen was photographed by L. M. Chace of Massachusetts

THE GREAT HORNED OWL

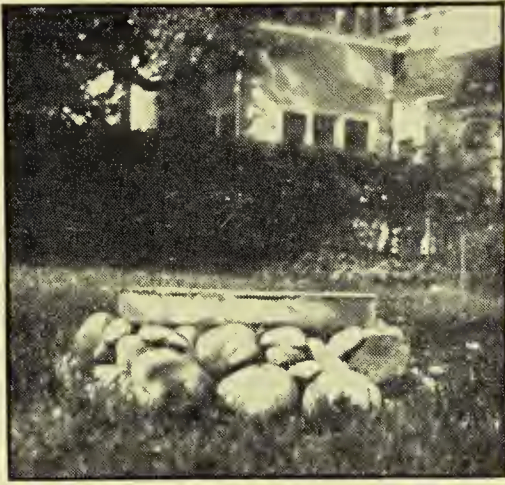
This owl is a great consumer of rats, mice and sometimes, unfortunately, small birds. An owl authority who watched a pair of the owls learned that they ate 1,596 mice, 134 rats, 54 shrews and 39 birds in one season



SHORT-EARED OWL
Take good care of him
as he eats mostly mice



BIRD BATHS

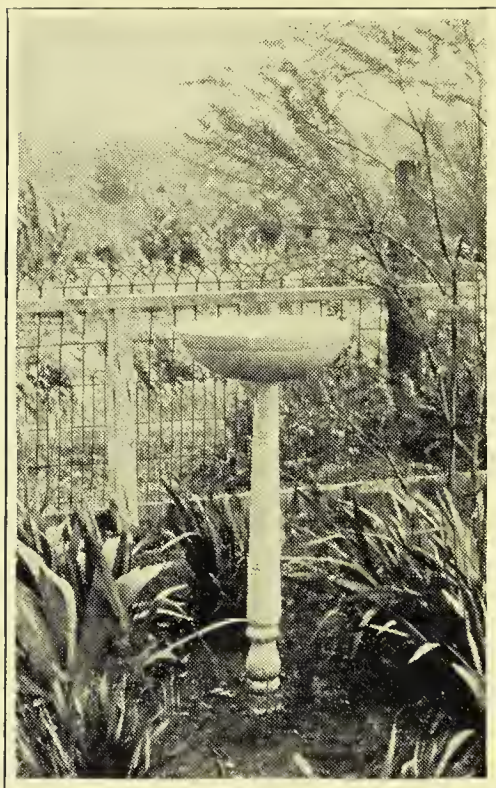


Simple and artistic and a real delight for the birds. A bird bath of simplest construction, but which has been much enjoyed by the robins, blue jays, wrens, and other feathered denizens. The cover of a large-size galvanized garbage can was used as a mold, after being carefully lined with greased paper. The cover was filled about three-fourths full with cement; then as the cement slowly hardened, it was drawn gently and constantly with a wooden paddle, back from the center and toward the edge; until, when the cement finally "set," it reached up to the rim of the cover at the edge, and sloped very gently and gradually downward toward the deepest part of the center. It was set upon a low mound of stones, about which gay red and yellow and white portulacas were planted

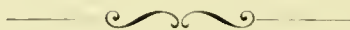


Mr. Blue Jay is too happy for words

BIRD BATHS



Every one who has the space should have a bird bath. Note the small tree near this bath, to which the birds can fly and preen their feathers after a refreshing bath



AN EASILY MADE POOL

Scoop out the soil in an elliptical hollow, four feet by three feet six inches, with the sides sloping down in all directions toward the center. The proper depth for such a bath is four or five inches at the deepest point. Then mix Portland cement and coarse sand—one part cement to four parts sand. Add enough water to give it the consistency of common mortar. With either your hand or a mason's trowel plaster the surface of the hollow with the mixture, putting in enough to make the depth at the center about three inches. It is well not to make the sides of the pool too smooth, as the birds are often wary of a slippery footing

see that cats, red squirrels, English sparrows and all enemies of bird life are kept out. A committee should be appointed to feed the birds regularly in winter and keep the baths filled with water during the summer.

A protected bird sanctuary will prove an attraction to your neighborhood, and will interest and instruct. Cemeteries make excellent sanctuaries for birds.

Don't wait until some one else starts the movement, do it yourself. There will be many willing to help.

TREES, SHRUBS AND VINES THAT ATTRACT AND FEED BIRDS

One of the best ways to increase bird population is to plant such vegetation as will appeal to the birds' appetite and help feed the many hungry, gaping mouths. If you have room for but one tree, plant a Russian mulberry. No other tree will attract so many different varieties of birds. Robins, tanagers, catbirds, orioles, thrushes, sparrows and many others flock to it.

Wise farmers plant mulberry trees, shad bushes, wild cherries, etc., and their cherries and strawberries are not seriously damaged. Birds are fruit hungry in the spring, and, as much of their

natural food has been destroyed, they eat the cultivated fruit.

Here are the trees, shrubs and vines that will attract birds: **TREES**—Russian mulberry; dogwoods; wild, sand, black and choke cherries; hackberry; box elder, white thorn; white ash; mountain ash; European ash; balsam fir; red cedar; white spruce; pitch; white and Norway pine; and hemlock.

SHRUBS—Elders; raspberries, blackberries; sumacs; juniper berries; service berries; holly berries; huckleberries; spice bush; haws; snowberries; shad bush; fever bush; barberry; cornels; dangleberry; black alder; privet; choke berry; buckthorn; swamp gooseberry; wild rose; thimbleberry; Indian currant; arrowwood; sheep berry; and high bush cranberry.

VINES—Wild grape, Virginia creeper, bitter-sweet, moonseed, matrimony vine, clematis, honeysuckle and trumpet vine.

HERBACEOUS PLANTS—Sarsaparilla, buckwheat, sunflower, Japanese millet, poke berry, wild rice.

Don't forget to plant at least one tree, shrub or vine, dedicated to the birds, each Bird Day.

Order these trees, shrubs and vines from your favorite nurseryman. Explain to him what you want your purchases for and he will help you get the right things for your particular locality.

REPORTS ON TREES, SHRUBS AND VINES

“My choke cherry tree was visited by flickers, cuckoos, robins, and many other birds.” Florence Reynolds, New York.

“The wild cherry is the best bird food of all wild fruit. The cherries dry on the trees, then fall to the ground about the time the leaves drop; these leaves cover the cherries and the birds can get them all winter. When the cherries are ripe, many birds come daily to enjoy them. More wild cherry trees should be planted.” Ole A. Runyon, Kentucky.

“Evergreens, especially valuable to bird life, are Norway spruce, white pine, Scotch pine, American arbor-vitae, white spruce, Douglas fir, balsam fir, hemlock and Colorado blue spruce.” V. D. Hill, Illinois.

“A Russian mulberry is one of the most valuable trees for attracting birds. In New York state one such tree was visited by robins, cat-birds brown thrashers, wood-thrushes, Wilson’s thrushes, scarlet tanagers, kingbirds, orchard orioles, Baltimore orioles, purple grackles, red-winged blackbirds, song sparrows, startlings, vesper sparrows, English sparrows, yellow-billed cuckoos, redstarts and flickers. Twenty-one different species.” B. L.

“Before coming to Michigan, we had a place

in Wisconsin that had both choke-berries and red elderberries, and the birds never ate the choke-cherries until the elderberries were gone. The red elderberries grow six to eight feet high in two seasons and bear an abundance of berries. They are different from the purple elderberries sometimes used for making wine." C. R. Kent, Michigan.

RESULTS OF BIRD PROTECTION

At Wallops Island, Virginia, the results secured by destroying the enemies of birds and by putting up bird-houses, were remarkable. These observations were made between 1912 and 1922.

This island covers about 6,000 acres, half being salt-water meadows and marshes; there are 250 acres of old field pines. It is off the eastern shore of Virginia, separated from the mainland by creeks and salt-water bays, and is about five miles from the town of Chincoteague. It was especially adapted for a bird sanctuary, as it had long been noted as a harboring place for wild web-footed fowl, shore-birds and others. There are dense thickets of "kinck," many myrtle bushes, and various other kinds of shrubbery. At the time the protection was given the birds, there were sheep, cattle and three bands of wild horses (Chincoteague ponies) on it.

It was conclusively found that numerous fish-crows that annually nested there were very destructive to the bird life, and in 1921 seventy-two nests, in 1913, fifty nests, in 1914, twenty-seven nests, and in 1915, eight nests of these crows were destroyed.

Fish-crows, as egg-eaters, were caught with the "goods." Under two crows' nests were found the shells of 140 mud hens, five green heron eggs, one marsh hawk egg, parts of three rabbit's legs and skulls, claws of sand and blue crabs, parts of mud turtle, a small lobster, and a rice-rat.

The breeding colonies of crows were practically exterminated in the springs of 1914 and 1915 and there was at once noticed a great increase in the number of beneficial birds. Previously, but one to three pairs of wild black ducks nested on the island; after the crows were banished, at least fifty pair had broods.

The destructive semi-wild house cats, English sparrows and black snakes were either entirely wiped out or reduced in numbers. The first bird-houses were erected in the fall of 1914. They numbered 135. 122 survived the storms, and in May, 1905, 107 had happy bird tenants. Later, the late Dr. Warren and I built and put up more than 200 additional houses. Various kinds were used, and they were placed on trees and poles,

against houses, etc., so that a careful study could be made.

Tree-swallows nested in 125 bird-houses three years after the bird-houses were erected. Before bird-houses were erected, only two pairs nested here in deserted woodpecker cavities.

Rats increased on the Island as elsewhere and they did great damage. They destroyed three covey of quail and hundreds of meadowlarks. They ate the eggs of young of all varieties of both song and ground-nesting birds. A campaign was waged against them.

English sparrows were eradicated and the result is that the tree swallows built in boxes nailed to the club house. In one winter, the English sparrow ate five bushels of oats belonging to the Government.

Every species of bird increased after they were given protection. Summer, or lesser yellowlegs arrive from their nesting grounds about July 20th. On the 25th, two flocks of about 300 each fed in the fresh-water ponds.

The only species of curlew seen is the Husonian, and they were observed in large flocks the last week in July. This is the largest species of the shore-birds which visits here during the spring and autumn migrations.

Three pairs of willets nest here. Their bills and legs are long and bluish in color. The general

color of their plumage is white, brownish, and black; the under parts nearly white. Willets feed largely upon sand-fleas and small crabs.

Three species of wrens breed on the island—the house, Carolina and long-billed marsh-wren. Fully 100 pairs of wrens nested in bird boxes. The long-billed marsh-wren make globular nests in the marshes of dead grasses, which are securely fastened to swaying reeds, cat-tails and rank green grasses, and lined with fine, warm materials. Eggs, five, six or seven are dark brown. The short-billed marsh-wren is a rare visitor here. The nest is similar to the long-billed, but its eggs are white. These wrens were highly beneficial on the Island, living almost wholly upon destructive forms of insect life. It is important here to mention that in some places house wrens are as destructive as the blue jay to other birds, destroying their eggs and may have to be controlled. They are likely to develop this habit when too many boxes are put up and too many wrens attracted.

In 1916, two pairs of Carolina wrens bred here for the first time, and the same year, for the first time, a bluebird nested in a bird-house. They are migrants or winter residents. One pair used a bird-box.

Yellow-breasted chats breed here in great numbers. Their nests are very hard to find.

THE IMPORTANCE OF A BIRD BATH

Birds have more difficulty in getting water than they have in finding food. Many birds are compelled to fly miles to obtain water. Young birds that are unable to fly such a distance, often die for lack of this necessity. Consequently, there is no easier way to cultivate their companionship and friendliness than to make provisions for them in the way of drinking fountains and bathing pools.

"Never have I been more repaid for time and effort than has been the case with my bird pool" said a lover of birds as he showed me the four-foot circular basin which he had sunk in the ground in his yard.

"Many of the thrushes, even the shy wood-thrush, have lingered near the pool for a day or two during the spring migration, as though wing-weary and worn. Whole companies of happy, chattering, white-throated sparrows made the spot their headquarters for about a week in the early part of May and again in September. Robins, bluebirds, wrens, catbirds, brown thrushes and other birds flutter about it every hour in the day.

"The most comical thing I think I have ever seen in bird life happened when a wandering

party of crow blackbirds discovered the pool one day in early fall. For fully ten minutes pandemonium held sway. Every "mother's son" of them tried to bathe at the same time."

Birds are not particular as to how their bathtubs are made, but there are general principles which should be followed:

First. Have the bath where it is safe from cats. There should always be bushes or trees near the bath, as birds can not fly far with wet feathers. They must first dry and preen them.

Second. Provide shallow places where the birds may enter the water. Land birds never go directly into deep water, so a series of steps or stones should be arranged to provide depths from half an inch to two and one-half inches.

Third. The edges and bottom should never be slippery. Roughen the edges and put fine sand on the bottom.

Fourth. These baths can be sunk in the ground or placed on the top of a post or trunk of a tree. Most birds prefer the baths on the ground. Make them of small pebbles laid in cement.

At Meriden, N. H., galvanized iron pans were used. These are three and one-half feet long by two and one-half feet wide, with a sloping bottom. They are painted with a thin coating of rough cement; at one end the water is half an inch

deep and at the other end, two and a half inches. Change the water at least once a day and if very warm, twice a day.

These bird visitors used a New York bird bath—I think it is the record list: robins, catbirds, song sparrows, starlings, meadowlarks, goldfinches, phoebes, kingbirds, cedar waxwing, yellow-billed cuckoo, redstart, black-and-white warbler, Baltimore and orchard oriole, brown thrushes, Wilson thrush, chickadees, bluebirds, crested flycatcher, least flycatcher, barn swallows, chimney swifts, purple martins, purple grackles, flickers, red-winged blackbirds, scarlet tanagers, yellow warblers, house wrens, chipping sparrows, vesper sparrows, Maryland yellow-throats, bobolinks, blue jays and purple finch. Thirty-five different varieties. Who can beat this list?

In winter, in the northern states, our birds suffer from thirst. Heat a brick and put on it a pan of water. Of course this must be in a place where birds are safe from their enemies.

CHAPTER XXXV

FEEDING THE BIRDS IN WINTER

THERE are many cranks in the world, and they have very peculiar ideas. Year after year, you will hear some one making a big bid for attention by saying, "Don't feed the birds; let Nature take its course." Years of experience in feeding the birds have taught me one positive fact. Wherever the birds in the cold districts have been fed, they increased in numbers, few dead birds were found, and more bird-houses were occupied the following spring.

It is a mistaken idea that artificial feeding spoils birds for doing their work as Nature intended. This feeding is but a makeshift, and the birds will quickly desert your most attractive feeding places when they can secure their food from Nature.

Everywhere the birds' natural food has been destroyed, and if we want the birds it is for us to supply their needs. Feeding should begin as soon as the birds' natural supply becomes scarce. Don't wait until a cold rain or wind-storm drives the birds away.

Feed birds regularly. Spasmodic feeding does

little good. Birds digest their food quickly, and during severe weather, a few hours of hunger will destroy a great number of our smaller birds.

There are many ways of feeding the birds. Some will take their food from almost any place; others will only eat from the ground. Remember that food must be placed where the birds can eat in safety. Watch the cats.

FEEDING-HOUSES

(Illustrations on Insert Pages)

A very simple feeding place is made of an open-fronted box (Fig 1). Place it on top of a pole, against a building or on a tree. Such a box should always be placed with its back to the prevailing winds. A cheese-box lid on top of a pole attracts birds (Fig 2), and you will be able to watch the birds feeding. This is both interesting and instructive.

Window boxes are excellent. Attach them to your window and you will have the delightful experience of watching the birds dine with only a sheet of glass between you and them (Fig 3). More elaborate feeding-houses are shown in Figs. 4, 5 and 6. These houses are not expensive to build and can be made very ornamental.

When possible, use cedar with bark on. In fact, the more rustic these houses can be made the better they will look. Do not place the houses

in the open, but have bushes or small trees around and against them. Every farmer should have at least one food house for birds.

A good general height for a food house is five feet to bottom of roof. The upper part should be four and one-half feet square. Upper feeding table, two feet square and placed four feet six inches from the ground. The lower small feed box is only used to attract the birds, and many bird lovers remove it after the birds have found the top and main feeding box.

On Fig. 4 the front panel is shown partly omitted so that the food box can be seen.

Fig. 5 shows a good type of house to use when shy birds are fed by scattering food on the floor. Many birds will only feed from the ground. This house has also an upper feed box.

Fig. 6 shows the umbrella-style house. The roof must be strongly fastened to the center pole.

On all these houses, in winter, suet should be fastened with wire to one of the supports. It is no uncommon thing to find birds nesting in the upper part of these houses, and they soon come to them for protection during cold and blustery weather.

PLAN FOR FEEDING-HOUSE

Take a box open on one side and put a bolt through it (Fig. 1). Nail a board on top to make

a sort of weather-vane (Fig. 2), and when the wind blows it will turn the opening away from the wind. Fasten on stump or pole (Fig. 3). This was made by my friend, Otto Horde, North Dakota.

A bird feeding-house for juncos and sparrows should be about five feet from the ground, on a post high enough to prevent cats from leaping up to it. The feeder should be roofed over to guard it from the snow. The roof, if made of strong pieces of wide bark, over-lapped if need be, will not frighten the birds away. When there is no snow, a little seed, crumbs and cornmeal should be thrown on the roof so that the birds will see it easily and be attracted. The box, so-called, is really a tray with a narrow ledge to prevent the food from falling off. A center upright on each side and a ridge-pole higher than the same construction at each end will hold the bark roof pieces. These should be preferably not more than seven inches from the box and sloping a very little each way.

BIRDS THAT EAT FROM THE GROUND

For those birds that will eat only from the ground, clear one place under your window, and one some distance from the house for the shyest birds. Never throw the feed on the snow.

Either clear it away or place bagging or burlap on top and scatter the feed on it. An inverted V-shaped shelter on the ground and a barrel placed under an evergreen, make good feeding places. Study the birds and their requirements.

A CORN-STALK SHELTER

The many houses and feeding stations, the thick undergrowth, and the big roots from fallen trees, are all good shelters, but especially fine is an arrangement of rails and cornstalks. Fence-rails are laid on the ground, some distance apart, then a layer crosswise, and so on until a series of five or six rows is made. Around and on top of these rails are placed corn-stalks until the rails are entirely covered. A better shelter can hardly be made. The birds work in through the stalks, and there are always plenty of dry, warm places in between the rails. The water can not get through and food is thrown between the rails. Hundreds of birds use these throughout the winter. In the spring, the shelters are burned and new ones are built in the fall. These corn-stalks can be from ten to thirty feet long.

FOODS RELISHED BY THE BIRDS

Suet is one of the best foods for the winter birds. Fasten it on the trunks or branches of

the trees. Unless you put a wire guard around it, the blue jays are apt to carry it all away. Bones, scraps of meat and rinds of pork can also be used.

A variety must be given to satisfy both the insect-eating and seed-eating birds, and the following are all good feeds: Hemp-seed, millet-seed, cracked corn, cracked wheat, whole corn, whole wheat, bread and cracker crumbs, dog biscuit broken, broken nuts and nut meats, sunflower-seeds, chaff, oats, canary-seed, doughnuts, salt, celery tops, curds, blemished oranges, apples, old mortar and fine grit.

Sheaves of wheat, oats and barley securely fastened to a pole or tree are relished. Never feed spoiled or sour foods. Birds will usually visit your feeding places at regular hours, and very often twice a day.

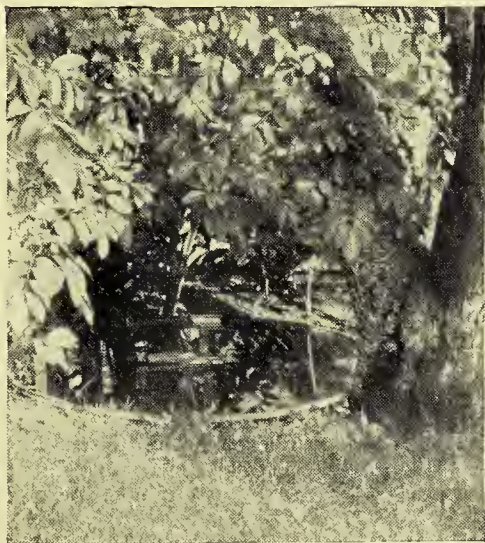
EXCELLENT PLANS FOR FEEDING THE BIRDS IN WINTER

Before Christmas, trim your porches thickly with evergreen branches and small evergreen trees. The greens attract the birds; and among the branches place feed boards and suspend feeding boxes from the ceiling so cats can not reach them. Keep suet and fat meats on hooks. All the birds except snowbirds like meat. Feed butter-

BIRD BATHS

A thrush ready for his
daily dip.

A bird bath at
Wyncote, Pa.



Think of the joy here for a
thirsty bird

ENEMIES OF BIRD LIFE



THE HORESHAIR SNARE

But the
Greatest
of all
has
been
MAN



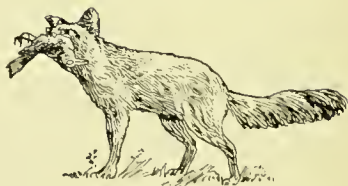
THE ALWAYS HUNGRY CAT



THE WEASEL



SQUIRRELS—BOTH
RED AND GRAY



THE SLY FOX



AIGRETTES

These are the plumes from the snowy herons. For years they were torn from the quivering body of a freshly murdered nesting bird. The nestlings slowly starve to death

FEEDING PLACES

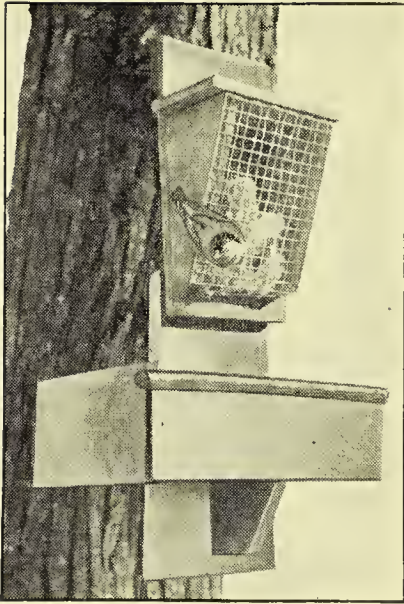


Window feeding-box used regularly by many birds. Two chickadees and a redpoll are shown feeding

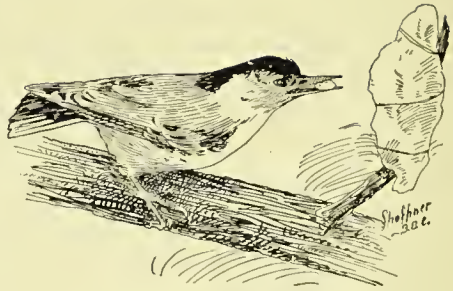
Feeding the birds at Buck Hill
Falls Liberty Bell Bird Club
Sanctuary



FEEDING PLACES



Suet basket and feeding box



A nuthatch eating suet



Here we have three juncos enjoying
their dinner at a feeding-shelf

nut meats, cornbread, cracker crumbs and seeds to the snowbirds.

Secure, during the summer, a dozen or more sheaves of wheat, oats, corn and barley. These sheaves should be kept in large tin boxes until the cold weather sets in, then fasten several sheaves together and place on a pole stuck in the lawn in front of the house. It is a pretty sight to watch the scores of various birds feeding. For the birds that are not grain eaters, hang cocoanut half-shells out on the posts of the veranda, and fill these with bits of suet and fat. Also hang up odd boxes with meat in them.

When snow is on the ground, spread sacks on top of it, fasten them down securely and scatter the feed on top of the sacks. Shy birds can be fed by dropping the food on a clean place under the window, or by putting food on top of a barrel under an evergreen.

THE BIRDS' CHRISTMAS TREE

Every one who can, should have a Christmas tree for the birds. If you can't get an evergreen, use some other tree and tie sheaves of wheat, evergreen branches or corn-stalks all over it.

Take the tree and plant it securely in some place that is partially protected from the wind. Then make little cages of chicken-wire and fill

them with suet. Hang a half-dozen of these on the tree. Take boxes, cut out part of the fronts, and fasten these on the tree with the backs to the prevailing wind. In these boxes have a variety of feeds—hemp, millet, sunflower seed, buckwheat, rolled oats, cracked wheat, cracked corn and nuts. Cocoanut shells can be cut in half, filled with grain and suspended from the branches.

Hang up some doughnuts and cakes and see how they are relished. Take some peanuts, string them and suspend them from the branches.

The more dense the tree is, the better the birds will like it, and it also gives more protection from storms.

It is well to put wire or a band of tin around the trunk to prevent the cats from getting the birds.

When these trees were put up last winter, they were visited by thousands of birds, and proved one of the best ways of attracting, feeding and keeping them.

SPECIAL FEEDING HINTS

Curd is much relished. Hemp is one of the best seeds for seed-eating birds. Japanese millet is also good. Broken nuts of all kinds, sunflower seed, squash seed and cracked corn will attract nuthatches, chickadees and blue jays. Blemished

or wilted oranges cut in half, or specked apples, are greedily eaten. Most birds prefer oats to wheat. Sheaves of wheat, oats or barley securely fastened to a pole and put out on the lawn become a feeding place de luxe. Common table salt is much relished by many birds. Old mortar and fine poultry grit are enjoyed by crossbills and other birds, evidently as a means to help digest their food. Bread or cake crumbs, broken biscuits, ground oats and wheat, canary seed, boiled rice, celery tops and chopped meat will all be eaten by various birds. Mountain-ash berries are fine to use during the spring migration; also butternuts, scraps of meat, pumpkin and apple seeds.

Hummingbirds, the daintiest of our feathered friends, are attracted by lilacs and the trumpet-flower, but as these are not always available, try hanging up tiny medicine vials filled with honey or sweetened water. Hang red and yellow strips of cloth from these bottles.

Trim your porches in the fall with evergreen branches. The greens attract the birds. Place feed boxes among the branches and also suspend them from the ceiling. Fasten suet and fat meat where the birds can get it.

Cocoanut shells cut in half and suspended by wires make safe and good feeding places.

Birds attract birds. Gradually draw them close

to the house by scattering broken nuts on the trees and ground.

Foods to attract wood-ducks, black ducks, Canada wild geese and other species of ducks and geese are grain, lettuce, eel-grass and the planting of wild rice.

CHAPTER XXXVI

HOW TO ORGANIZE A BIRD CLUB

SEND letters to those you would like to interest, to meet at a certain time and place to talk about the protection of song and insectivorous birds. State that insects cause a yearly loss of more than \$1,000,000,000; that the natural enemies of insects are the birds, and that more than 75 per cent. of our bird life has been destroyed.

At the meeting, explain in detail the necessity of saving the birds. Have a pledge and ask all to sign. Here is a good sample pledge: "I desire to become a member of the Liberty Bell Bird Club, and promise to study and protect all song and insectivorous birds, and do what I can for the Club."

If a school club is to be organized, the teacher should invite all pupils to join, explaining the need of bird study. Give your organization a name, for instance, "Deep Glen Bird Club."

HERE IS A GOOD PLATFORM FOR ANY CLUB

Protection, by adequate laws, throughout the world for all song and insectivorous birds.

The teaching of practical ornithology in all public and private schools.

The regulation, but not persecution, of cats, red squirrels and all enemies of beneficial birds.

The establishment of bird sanctuaries in every city, town, village and hamlet.

The planting of trees, shrubs and vines that will attract and feed our birds.

The putting up of safe and artistic bird-houses and the feeding of our winter birds.

The establishment of a National Bird Day on the second Friday in April of every year, to arouse interest in birds, bird conservation and bird protection.

The club should have a director, a vice-director, a secretary and treasurer. In school clubs the teacher should be the director. Dues, if any, should be very small, and the money collected should be used for awards and for the purchase of bird pamphlets, etc.

Do not be disheartened if success does not crown your efforts at once. Stick to it, and you, no doubt, will be able to bring many new ideas into the club.

BIRD LAWS

Practically all song and insectivorous birds are protected under the Federal Migratory Bird

Law. All law-abiding citizens should observe its provisions and regulations. Any report of violation will be carefully investigated, and when sufficient evidence is secured, the case will be reported for prosecution. Make all reports to United States Department of Agriculture, Washington, D. C. The Federal Migratory Bird Law can be obtained from that office.

GOVERNMENT BULLETINS

Many valuable bird bulletins are sent out by the Biological Survey, Agricultural Department, Washington, D. C. Write to the Superintendent of Documents, Washington, D. C., and ask for a list. From this list you can order those you need. Many are free, a few are very reasonable in price.

A PLAN OF STUDY FOR BIRD CLUBS

The special duties of all members should be to:

- (1) Make a complete list of all the birds found in your neighborhood, the permanent residents, winter visitants, the transient visitants, and the summer residents, also a census of the nests.
- (2) Find out which birds are decreasing and why.
- (3) Make a list of birds you would like to see increased.
- (4) Find out the enemies of insectiv-

orous and song-birds in your immediate neighborhood. (5) See if the birds have proper nesting facilities. (6) Put up bird-houses suitable for the different birds, and have bird baths. (7) Study migration, and note how the birds act before and during migration. Keep a record of when the birds arrive and depart; whether they fly by day or night; if both sexes are together and note the actions of the young. (8) Take bird walks. (9) Make a study of each bird from observation, have a date of its arrival and whether it arrives singly, in pairs or in flocks, where found most abundantly—in woods, orchards, open land, etc., what it eats; its song and calls, where it makes its nest and description of nest, particulars about eggs; how the birds incubate them; feed of the young and how the young are fed; how long they remain in nest; color; early flight; particulars of their migration, etc. (10) Feed the birds in winter and study their actions. (11) Interest others in the protection of birds. (12) Try to have a bird sanctuary in your neighborhood, and (13) Study the rookeries of the crows, purple grackles, red-winged blackbirds and swallows.

SUGGESTIONS FOR MEETINGS

First. Repeat in concert the Pledge of the Bird Club. All Clubs should have a pledge.

Second. Members report all the different varieties of birds seen since the last meeting. This report to be written, read and given to the teacher or director, and to be filed for comparison next year. The entire club should be appointed as a committee to report all birds seen. This is especially important during the spring and fall migration. A club or school migration record should be kept and from year to year the variations noted. To add to the interest, a small prize can be awarded to the member reporting the first of the various species, and in schools his or her name can be placed on the blackboard, to remain there for a week.

Third. Recitation or reading—a bird poem or bird story.

Fourth. Members report what they have observed and all special bird work done by them.

Fifth. Composition on a subject to be given by the teacher or director.

Sixth. Question box.

Seventh. Work outlined by teacher or director for following week. The study of a different bird should be taken up every month, and short essays read bearing on various phases of it, such as its appearance, its habits, its nest, its young, etc. Instil in the members' mind the loss to farmers by insects and how the birds protect our harvest.

Eighth. Reports given of bird-houses, bird

feeding stations and bird baths that have been made or put up during the week. Also give reports of all trees or shrubs that have been planted to feed the birds.

Celebrate Bird Day on the second Friday in April, and see that the local papers have frequent bird items and news about the club.

STUDYING THE BIRDS FROM LIFE

Anytime in the year is a good time to study and observe the birds, but during the spring and fall migration periods is perhaps the best. Much can be learned from books, but the very best way is to go out in the highways and hedges, woods and plains, and get your knowledge first-hand. Don't think, for one minute, that everything has been learned about the birds. We are really just beginning.

Birds are found almost everywhere, but especially in orchards, back-yard gardens, roadside fences, overgrown pastures, trees of village streets, at the entrance to a woods and along the borders of springs, brooks and rivers.

Where there are insects, there you will find birds. There are very few birds in the deep woods, but many at the sunny edges. You can nearly always find birds along the brooks and streams. This is a good place to observe them, as

they have the double attraction of bathing and a great supply of insect life. Here they are apt to remain for a greater length of time than elsewhere.

In nesting time, birds are at home most of the time. During migration, the best time to observe them is between 4 and 8.30 o'clock in the morning, and 4 to 8 o'clock in the evening.

Always wear clothing that is dull in color and strong in texture. It should be old, so you needn't worry about your clothes. Always remember that you are out to study the birds and they should have your entire attention. Wear nothing that sparkles or shines. Birds have sharp sight, and at the first flash, off they go. Wear strong and easy shoes. Some bird stalkers wear moccasins.

If possible, take with you opera or field glasses. This is very necessary if you are going to do much observing. It is almost impossible to get close to some birds. While using the glasses, be careful the sun does not shine upon the glasses or the flash will startle the birds.

Have a pocket note-book and a soft pencil. Begin your notes with the season (spring, summer, fall or winter). Give date, and condition of weather. Write your notes briefly, but have them complete. As soon as you get home, copy the notes in detail. If you leave them for any length

of time many important facts may be forgotten. Some students are able to write without looking at the paper. This enables them to keep their eyes continually on the birds. Birds are very suspicious. They do not like to be inspected, and their eye-sight and hearing are remarkable. Try to make them think you are merely a passer-by. Keep back of trees and bushes as much as possible. Learn to stalk like an Indian. Creep up gradually toward the subject, and, above all, have patience. Time and again, after hours of stalking, off will go your birds and all the work must be done over again. When you get as close as possible to the bird, remain perfectly still for some time. The bird will then think his enemy has gone. In watching birds feeding their young, get close to the nest while the parents are away.

Note the shape of the bird, whether it is long, short, slender or plump, and make a note of its size comparing it to a crow, robin or sparrow. Write where you saw it, (along creek, river, lake, or in wood, field, etc.) and whether it was on ground, bush or tree. Carefully note its actions, whether it is slow or active, whether it wags its tail or not, and if it hops, creeps, walks, climbs or swims. Make another observation on its disposition. That is, whether it is with other birds and appears social or whether it is solitary and whether it is suspicious or unsuspicious.

Make close examination of its beak, feet and tail. They are important in identifying many birds. Particularly note length and shape of tail at end. Especially note the bird's flight, whether slow, swift, direct, undulating, soaring, sailing, flapping or labored.

The song and call of birds is another important feature to notice. The song may be pleasing or unattractive. It may be brief or continuous, low or loud, and sung from ground, bush, tree or in the air.

The call notes are especially interesting. They may be of surprise, alarm, warning, protest, signaling, calling, etc. Much about the call notes of birds is to be learned.

Through your glasses, study the way the bird secures its food, where it is secured, and if it consists of berries (wild or cultivated), insects or weed seeds.

Nothing will give greater pleasure than bird study. Don't expect to be an expert at once, persevere and you will be repaid a hundredfold.

LAYING OUT YOUR NOTE-BOOK

Have at least twenty-two spaces across your book and have each space marked as follows: (1) common name; scientific name. (2) Where seen. (3) Distinctive appearance. (4) Peculiar habits.

(5) Migration seasons. (6) Song and call. (7) Courtship. (8) Summer range. (9) Winter range. (10) Nest. (11) Eggs. (12) Period of incubation. (13) Condition of young. (14) Number of broods. (15) Food of young. (16) Food of adult. (17) Sex differences. (18) Color during various seasons. (19) Color variation during growth. (20) Value to man. (21) Value to Nature. (22) How to attract it.

THE VALUE OF BIRD CENSUSES

Every one who has a farm should make a complete census of the birds on his or her farm. A census of breeding birds means an exact and complete enumeration of the birds that actually nest within the boundaries of a selected tract of land. The plot chosen should contain from forty to eighty acres.

TIME TO TAKE A BIRD CENSUS

Censuses should be taken after the migration is over, at the height of the breeding season, when the greatest number of birds have eggs or young in the nest. If the work is done too early, some migrants may be counted as nesting birds, and if done so late in the season that the young are on

the wing, some pairs may have left the area where they nested.

This work must continue year after year, as records of over at last five years usually are needed before complete idea of bird life of a given tract can be formed.

METHOD OF TAKING A CENSUS

A convenient way of taking a bird census is to count the singing males very early in the morning. At this time, every male bird is usually in full song near the nest site; and, after migration is over, each one may safely be considered to represent a breeding pair.

Beginning at daylight some morning at the height of the breeding season, zigzag back and forth across the tract and count the singing birds, and at the same time, watch closely for individuals that may not be in song. Care must be exercised to count each bird only once (especially if it is necessary to retrace one's steps) and only one of a pair. The count should be repeated at least once, a few days later, or checked by subsequent observations throughout the breeding season, to be sure that no birds have been missed and that all birds counted, actually nest within the selected area. In the case of unusual species,

and especially those near the edge of their usual breeding ranges, the nest or other satisfactory evidence must be found, to show that the birds are actually breeding and are not merely wanderers or delayed migrants. A note regarding this evidence should accompany the report.

MANY CENSUSES DESIRED

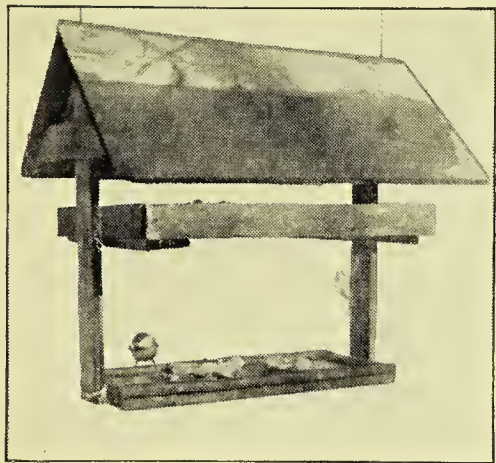
Data concerning the birds are wanted from farmlands, woodland, continuous forests, from irrigated sections of the West, marshland, close to centers of population, and in places where birds are especially protected.

REPORTS

The final results of bird censuses should be sent to the Biological Survey. The name of the present owner should be given, together with a careful description of the character of the land, including a statement of whether it is dry upland or moist bottom land; the number of acres in each of the principal crops, in permanent meadow, pasture, orchards, swamps, or roads; the kinds of fencing used; and the quantity of brush along fences, streams, and roads, or in the permanent pasture.

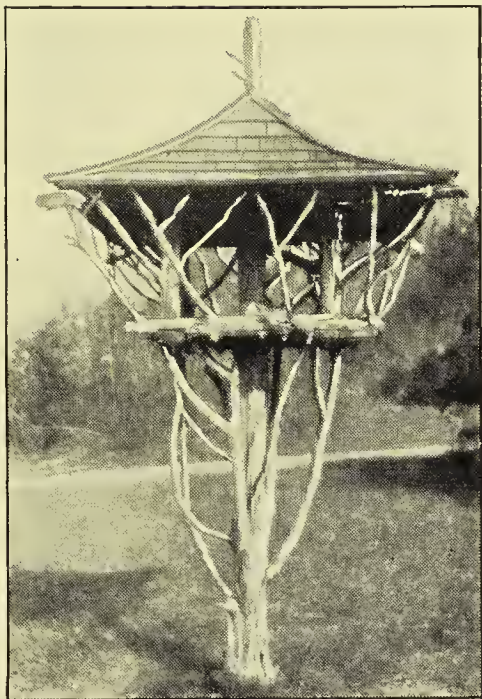
Blanks for recording the results of bird cen-

FEEDING PLACES



A picture of a food house which is easily built. A little chickadee is shown eating from it

Here is a fine rustic bird feeding house made out of a dead tree. As shown in the photograph, the limbs were cut so as to form braces for the feeding shelf and roof



FEEDING HOUSES

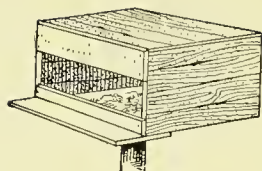


FIG. 1

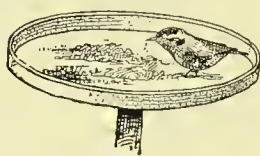


FIG. 2

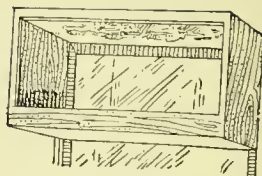


FIG. 3

For description
of these

Feeding Houses
See page 240

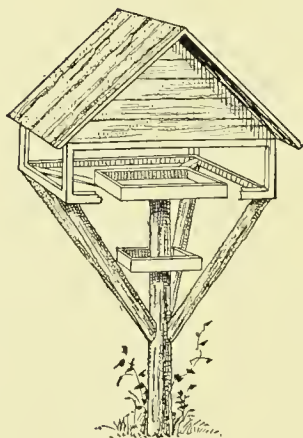


FIG. 4



FIG. 5

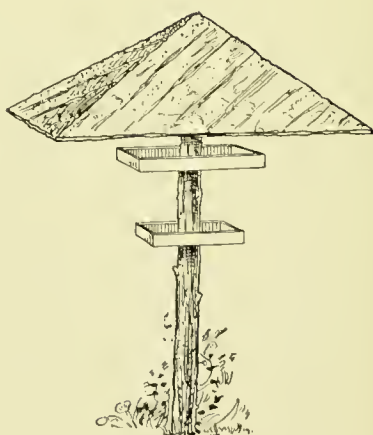


FIG. 6

suses, together with return envelopes which require no postage, can be obtained on request by addressing the Biological Survey, United States Department of Agriculture, Washington, D. C.

VALUE OF THESE CENSUSES

These censuses will greatly help the Biological Survey in their study of birds and their distribution. It is one way the individual can help this important department of the Government.

QUESTIONS ON BIRD CENSUSES

1. Why are bird censuses necessary?
2. Of what are censuses taken? When should they be taken?
3. What size plot should be chosen?
4. Should the census be taken every year?
5. Describe the best method of taking a census.
6. From what places are censuses especially desired?
7. Where are blanks to be secured and reports to be sent?

ANSWERS TO QUESTIONS ON BIRD CENSUSES

1. Bird censuses are necessary so that the Biological Department can more accurately determine the number of our birds and the distribution of the various species.

2. Censuses are taken only of the birds that actually nest within the boundaries of a selected tract.
3. The plot chosen should contain from forty to eighty acres.
4. A census should be taken every year, as it requires at least five years to get an adequate idea of bird life in a given area.
5. The census should be taken after migration is over, and at the height of the breeding season. Count the singing males very early in the morning, as at this time every male bird is usually in full song near the nest site. The count should be repeated at least once, a few days later to check up and see that no bird is missed.
6. Reports are wanted from farm lands, woodlands, continuous forests, irrigated sections of the West, marshland, close to centers of population and in places where birds are especially protected.
7. Blanks can be secured from the Biological Survey, United States Department of Agriculture, Washington, D. C., and to this place all reports should be sent.

CHAPTER XXXVII

Interesting Facts

THE BIRD AS A FOOD SUPPLY

THE game birds of the United States are an important asset. Years ago, any bird large enough to eat was considered game, and thousands of robins, meadowlarks, flickers and other birds were not only killed, but exposed for sale. Today, our laws define what are considered game birds and also limit the number of each species that may be killed in the season.

The number of licensed hunters in the United States is about five million. Think of it! Five million men shooting at the birds during the hunting season. It's a wonder that there are any game birds left.

A game bird is one which is good for food, and as to its food habits, is actually destructive if it becomes too numerous; or that it is neutral—neither beneficial nor destructive.

The principle game birds are the water fowl, ducks and geese, pheasants, turkeys, grouse, woodcock, quail, snipe, yellow-legs and rails.

A bird should not be on the game list unless it is prolific. That is the trouble with the rails and yellow-legs.

I believe in a shorter game season and a reduction in the number to be taken. This is necessary on account of the great increase in population, the increased number of hunters, and the comparative scarcity of some of our game birds.

All sportsmen should obtain a copy of the game laws from both their state authorities and the National Game Laws which can be secured from the Superintendent of Documents, Washington, D. C.

BIRD HEROES

Many pigeons were used in the World War and "50 American birds distinguished themselves at the front," declares the United States Signal Corps.

In the Argonne offensive, a pigeon had its leg snapped off by a German bullet just after starting homeward with its important order for relief; but it "carried on" for twelve miles with the note hanging by a ligament. A second shot struck its breast-bone. Still it kept on its way and delivered the vitally important note. The best of care was given it; a specialist dressed its wounds, it was put in a down-filled basket, and is alive today (1929) to be counted among the war heroes.

Another time, a whole battalion was cut off for five days from the army, with no communication whatever save that carried by the birds. Eventually reënforcements reached them, every winged messenger "getting across."

We Americans, our allies, and the enemies had hundreds of pigeons at the front. In the St. Mihiel salient there were nearly six hundred birds. As our men pressed forward faster and faster, all wires and regular means of communication were left behind, and the bird carriers became more and more necessary, their flights longer and longer every day. From five to twenty miles they winged back through smoke and leaden hail, often mud-covered and rain-soaked, bearing the calls for help, or the news of victory—the very words perhaps that you and I read in our morning papers during those sad fighting days.

HUNTING WITH A CAMERA

Hunt the birds with a camera and you will learn that real sport is not the killing of wild life, but the matching of human cunning against animal sagacity. It is not very difficult to shoot a bird, but to get a good picture of one takes skill.

A collection of photographs of bird life is educational, interesting and valuable. There are no

laws against camera hunting, and it is an all-year-round sport. It is not necessary to have an expensive outfit. Many excellent bird pictures have been secured with a moderate-priced camera.

One way to photograph birds is by careful stalking. It is surprising how close to the birds you can get if patience is exercised.

One of the simplest and the most successful method of photographing is to proceed as follows: After selecting a location where birds seem to be very plentiful, adapt a small space, suitably lighted, as a feeding station. Daily scatter, in this location, a few crumbs, grain seeds or table scraps until the birds become accustomed to coming to this place for food. Then is the time to make your first trial.

To do this, conceal your camera near the feeding station, taking care that the lens has an unobstructed view of the spot where the birds usually feed. Attach a string to the shutter release and run it to your hiding place, which should be several yards away, taking care that the cord plays free and that the action is not hindered by twigs or branches, so that by pulling the string, the shutter is released and a picture taken. Of course the camera must be securely fastened, otherwise you might upset it.

If it is desirable to secure a very close photo-

graph of the birds, the use of a portrait attachment is advised, as this allows you to work closer.

It is not hard to photograph the nests of birds, and in this way, very often the older birds become accustomed to the camera and later you can get a photograph of the young birds and the older birds feeding the young.

The nest should not be touched until all the eggs are laid and preferably not until the bird has incubated for a few days because if disturbed when beginning to incubate, she may desert the nest. Then, when the time to photograph comes, the greatest care must be taken not to spoil the good hiding of the nest. If it is necessary to expose the nest to better light, the vegetation should not be cut away, but should merely be bent aside in such a way that it can be restored to its original position. If proper care is used, the bird will return to the nest as if her secret had never been discovered, and the photographer will be rewarded by being able to observe and photograph the young.

Very often, by taking a small mirror with you and throwing the light on the eggs or nest, you will get a much better and sharper picture. Take plenty of time and with patience you will be able to get some wonderful bird pictures. Remember, expensive outfits are not needed, but patience is.

THE BANDING OF BIRDS

We are learning much about the life of our feathered friends by the banding of birds. The work was begun scientifically by C. C. Mortensen in Denmark in 1897. Banding in the United States is now under the direction of the Bureau of Biological Survey of the Department of Agriculture. Adult birds are trapped without injury and the young birds are not molested. A pintail duck banded by a member of the United States Biological Survey staff at the mouth of Bear River, Utah, on September 16, 1914, was captured near Brawley, California, on October 17, 1926. The longest previous record of a banded bird's life was that of a white stork that carried a band of the Rossitten Bird Observatory in Germany for eleven years.

If you wish to study the birds in a scientific way, you should subscribe to "The Auk" and secure the A. O. U. "Check list of North American Birds" both of which can be secured from W. L. McAtee, care of American Ornithologists' Union, 200 Cedar Street, Cherrydale, Virginia.

CHAPTER XXXVIII

MORE OR LESS SCIENTIFIC

1. What is Ornithology?
2. Are birds classified according to how they look?
3. What does class "Aves" mean?
4. How is the class Aves divided?
5. How are orders divided?
6. What are the 200 orders recognized by ornithologists and according to the American Ornithologists' Union check list?
7. Into what are families divided?
8. Into what are genera divided?

ANSWERS TO QUESTIONS ON MORE OR LESS SCIENTIFIC

1. Ornithology is the science of birds.
2. Birds are classified not by the way they look, but by the way in which they are made. That is, their structure.
3. All creatures that wear feathers are included in the class "Aves."
4. The class Aves is divided into groups, or what are called orders. Each order includes a number of birds which resemble each other in fundamental structure. There are twenty orders found in North America.

5. Orders are divided into families which are based largely upon such external details of structure as shape of bill, length of wing-feathers, etc.
6. The orders according to the A. O. U. check list are:
 1. The Loons, order Gaviiformes.
 2. The Grebes, order Colymbiformes.
 3. The Albatrosses and Petrels, order Procellariiformes.
 4. The Pelicans and Cormorants, order Pelecaniformes.
 5. The Herons, Storks, Ibises, etc., order Ciconiiformes.
 6. The Ducks, Geese, and Swans, order Anseriformes.
 7. The Vultures, Hawks, and Eagles, order Falconiformes.
 8. The Gallinaceous birds, order Galliformes.
 9. The Cranes, Rails, etc., order Megalornithes.
 10. The Shore-birds, Gulls, Auks, etc., order Charadriiformes.
 11. The Doves, order Columbiformes.
 12. The Parrots, order Psittaciformes.
 13. The Cuckoos, order Cuculiformes.
 14. The Owls, order Strigiformes.
 15. The Whip-poor-wills and Nighthawks, order Caprimulgiformes.
 16. The Swifts and Hummingbirds, order Micropodiformes.
 17. The Trogons, order Trogoniformes.
 18. The Kingfishers, order Coraciiformes.
 19. The Woodpeckers, order Piciformes.
 20. The Perching Birds, order Passeriformes.

7. Families are divided into several genera (singular genus) which show relationship within the family. The characters used in defining genera are details in the shape of the bills, distinctive color-patterns, and other special features.
8. Genera are divided into the final division called the species, which is the term applied collectively to all those birds which resemble each other as closely as do the members of a human family.

ORGANIZATIONS THAT DO MUCH WORK FOR PROTECTING THE BIRDS

The American Ornithologists' Union, T. S. Palmer, Secretary, 1939 Biltmore Street, Washington, D. C.

The Liberty Bell Bird Club, Charles P. Shoffner, Secretary, *The Farm Journal*, Philadelphia, Pa.

National Association of Audubon Societies, William P. Wharton, Secretary, 1974 Broadway, New York City, N. Y.

Any of these organizations will be glad to assist you in any way they can, in the conservation of birds.

MAGAZINES DEVOTED TO BIRD LIFE

The Condor, W. Lee Chambers, Business Mgr., Eagle Rock, Box 123. California.

Bird Lore, D. Appleton & Co., Harrisburg, Pa.

Wilson Bulletin, T. C. Stephens, Editor, Sioux City, Iowa.

The Oologist, R. M. Barnes, Editor, Lacon, Illinois.

The Auk, Witmer Stone, Editor, Academy of Natural Science, Logan Square, Philadelphia, Pa.

CHAPTER XXXIX

IDENTIFYING THE BIRDS

IT takes an expert to identify all our birds, but there are some rules which help bird lovers to identify most of our common ones.

First, compare the size of a bird with these three which might be taken as standards; Crow, 19 inches; robin, 10 inches; English sparrow, $6\frac{1}{4}$ inches.

Second, note the color and remember the male is usually the brighter; and that after molting, many of our birds appear entirely different. Look especially for marks on wings (wing-bars), tail, and breast. Make careful allowance for sun and shade. A crow in a certain position in the sun looks white.

Third, watch whether the bird keeps to the air, is in the treetops or on the ground, and how it feeds.

Fourth, give careful attention to call notes and song.

Fifth, look for mannerisms. Note peculiarities of flight and alighting, and of behavior when

perched, singing, feeding, and when on the ground. See how the phoebe switches its tail around upon perching; how the redstart opens and shuts its tail like a fan; how the water-thrush teeters; the ovenbird walks; the kingbird flies with a labored, fluttering motion; and the woodpeckers "gallop" through the air.

As you positively identify the birds here listed, you can make a check mark after each name.

This list is grouped according to color, as I thoroughly agree with such an excellent ornithologist as Neltje Blanchan, that this is the easiest method for the beginner to use.

I have been greatly helped in this chapter by Edward H. Parry who is excellent in identifying birds in field work.

I have listed 106 land-birds. I have scarcely gone into the warblers as it takes an expert to identify them in the open. Don't forget that every observer sees birds in a different light. Summer or spring plumage only is considered.

BIRDS SHOWING YELLOW OR ORANGE PROMINENTLY

1. American Goldfinch: $5\frac{1}{4}$ inches. Known as thistle bird and wild canary. Male, yellow with black patch on head and black-and-white wings and tail. Female, without patch and duller in color. Found in flocks. Have sweet canary-like song, Undulating flight. Nest of down, plant fibres

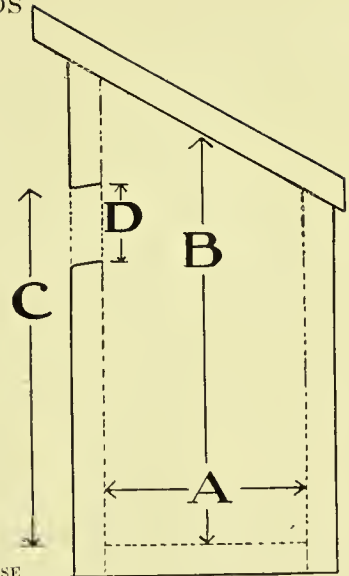
and grasses in forks of bushes. Eggs, 4 or 5, pale bluish-white.

2. Western Goldfinch: $4\frac{1}{4}$ inches. The male has more black on head and is grayer on back than the American goldfinch. Female, much duller. Abundant throughout the West. Generally found in flocks. Similar in song and flight to the American goldfinch. Nest similar to American goldfinch. Eggs, 4 or 5 pale bluish-white.
3. Yellow-throated Vireo: $5\frac{3}{4}$ inches. Upper part greenish gray. Throat, breast and line over eye, yellow. Identified by two whitish wing-bars. Generally keeps to the tree-tops. Song, similar to red-eyed, but less varied. Nest, pensile structure of strips of bark, grasses, etc., suspended from a forked twig. Eggs, 3 to 5 creamy or rosy-white specked with reddish-brown.
4. Baltimore Oriole: $7\frac{1}{2}$ inches. Male, black head and back. Yellowish breast and rump. Wings, black and white. Tail, black with yellow outer feathers. Female, yellowish-olive. Wings and tail brown. White on wings. The male is easily identified as he is like a flash of black and flame. Nest, a beautiful pensile structure of string, yarn, bark and milkweed stalks hanging eight or ten inches below supporting rim. Eggs, 5 or 6 white, scrawled with blackish-brown.
5. American Redstart: $5\frac{1}{2}$ inches. Male, black head, back and throat; red on edges of tail; red and orange on wings; white below. Female, grayish, yellow and white. Identified by habit of spreading and closing the tail. Flutter from tree-top to ground. Five or more songs, none really musical. Nest, plant fibers, horsehair and

grasses in forks of bushes or trees. Eggs, 3 to 5 whitish, spotted and blotched with brown.

6. Yellow-breasted Chat: $7\frac{1}{2}$ inches. Breast, yellow, dark above; white underparts. Head, dark with yellow line over eye. Identified by mimicing song and flirting of tail and twisting of the head. Nest of weeds and grasses near ground in tangled thickets. Eggs, 3 to 5 white, evenly speckled with reddish-brown.
7. Yellow Warbler: 5 inches. Male, upper parts olive-yellow; underparts bright yellow, streaked with reddish-brown. Wings and tail, olive-brown edged with yellow. Slender bill. Female has the reddish-brown streakings less distinct. Usually feeds near the ground. Very active and song is a soft wee-chee, chee, chee. Nest a beautiful structure of plant and vegetable fibers, fastened to upright forks of bushes or low trees. Eggs 3 to 5 bluish-white, marked with shades of brown.
8. Maryland Yellow-throat: $5\frac{1}{4}$ inches. Male, throat and breast bright yellow; head, olive-gray. Easily identified by what might be called a black mask which covers forehead, cheeks and sides of head. This mask is bordered behind by a grayish line. Female is without the black patch around the eye. Nest, rather bulky of grasses, strips of bark, etc., in clumps of grass on or near the ground. Eggs, 3 to 5 white with brown specks.
9. Dickcissel: $6\frac{1}{4}$ inches. Not very common. Male yellow breast with black spot. Gray head and back, chestnut on upper wing. Yellow over eye. Female much duller. Song a chanting "Chip,

HOUSES FOR BIRDS (See page 216)



“WING” BIRD HOUSE

	A Inches	B Inches	C Inches	D Inches
Bluebird	6 x 6	10	8	1½
Wren	4 x 4	6 to 8	4 to 6	1
House-Finch	6 x 6	6	4	2
Crested Flycatcher	6 x 6	10	8	2
Screech-Owl	8 x 8	15	12	3
Wood-Duck	10 x 18	15	10	6
Chickadee	4 x 4	10	8	1¼
Tufted Titmouse	4 x 4	10	8	1¼
Carolina Wren	4 x 4	6 to 8	4 to 6	1⅛
Tree-Swallow	5 x 5	6	2 to 4	1½
R. H. Woodpecker	6 x 6	15	12	2

GOOD TYPE OF BIRD HOUSES



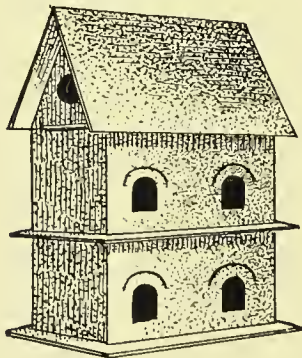
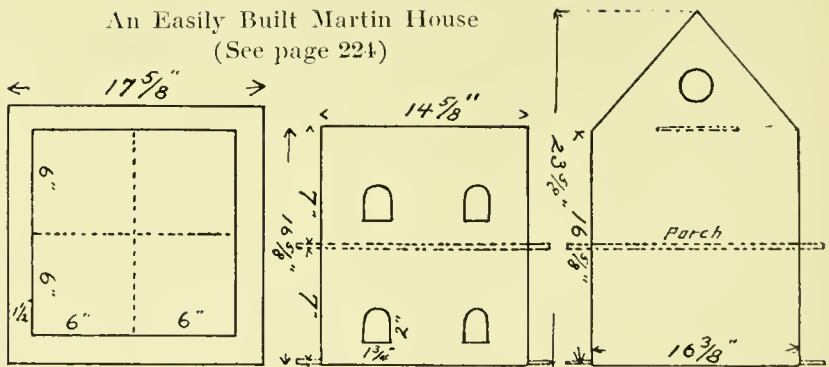
WREN OR BLUEBIRD



BLUEBIRD WOODPECKER & FLICKER WREN

HOUSES FOR BIRDS

An Easily Built Martin House
(See page 224)



OLD-TIME GOURD
MARTIN HOUSE



A 4-ROOM MARTIN HOUSE

- chip, che-che-che." Nest: on or near ground in bushes or low trees, made of weeds, grasses, rootlets, etc. Eggs, 4 or 5 plain bluish white.
10. Flicker: $12\frac{1}{2}$ inches. Identified by bluish head and neck with red crescent on back of head and a black crescent on breast. Back, brown and gray; underneath, yellowish spotted with black. White on rump. The male's cackle is one of the most rousing signs of spring. Drums also. Nest in cavity in a tree or a bird-house. Eggs, 5 to 10 white.
11. Meadowlark: $10\frac{1}{2}$ inches. Easily identified by yellow breast with big crescent of black on it. Back, brownish. Outer tail feathers show white when flying. Has a clear ringing whistle. Flies low as a rule, with quivering wing motion. Nest: on ground, of grasses, usually partially arched over. Eggs, 3 to 5 white, specked with brown.

BIRDS SHOWING RED PROMINENTLY

12. Robin: 10 inches. Red breast; black head; back, slaty-brown. Well known, easily identified. Nest: coarse, but substantial structure of mud and grass, placed at various heights. Will build in bracket bird-house. Eggs, 4 or 5 bluish-green.
13. Scarlet Tanager: $7\frac{1}{2}$ inches, scarlet with black wings and tail. Female, olive-green above, yellowish underneath. Wings and tail darker. Song usually passed for robin's, but it is a set song of fewer notes and hoarser tone. Nest: loosely made of twigs and rootlets on lower branches of trees. Eggs: 4 pale bluish green, spotted with brown.

14. Summer Tanager: $7\frac{1}{2}$ inches. Male, uniform red. Female, upper parts olive-green, underneath orange. Good singer. Nest: of twigs and rootlets on outer horizontal limbs of trees. Eggs, 3 or 4 bluish green, spotted with brown.
15. Cardinal: $8\frac{1}{2}$ inches. Male, brilliant scarlet. Chin and band around bill, black. Beak, stout. Well crested. Female, brownish-yellow above, gray below. Crest, wings and tail reddish. Known as "Kentucky cardinal." Nest: rather loosely constructed of twigs and grasses in bushes or thickets. Eggs: 3 or 4 bluish white, spotted with grayish or reddish-brown.
16. Pine Grosbeak: $8\frac{1}{2}$ inches. Male is rosy-red but female is gray and yellowish. Visits Northern New England and south to Ohio. Seen on pine and cedar trees. Nest: of twigs, strips of bark and rootlets on coniferous trees. Eggs: 3 or 4 greenish blue, spotted with lilac and brown.
17. Purple Finch: $6\frac{1}{4}$ inches. Male, rosy-red while female is streaked brownish-gray. Fine singers. In the spring, are seen on treetops where many joyfully sing together. Nest: of bark, twigs, grasses and rootlets on evergreens or orchard trees. Eggs: 4 to 6 greenish blue with strong blackish specks.
18. Redpoll: $5\frac{1}{4}$ inches. Gray back, crimson on top of head. Male has rosy breast. A winter bird found in flocks gathering seed from weeds. Song is canary-like. Nest: twigs and grasses in bushes or trees. Eggs: 3 to 5 pale greenish blue with brown spots.
19. Orchard Oriole: 7 inches. Male, head, throat, back and tail black. Rump, breast, shoulders,

reddish-brown. White on wings. Female; head, upper and lower parts, olive. Wings, brownish. Nest: pensile, of dried greenish grasses, beautifully woven, suspended from a fork of a tree about 15 feet above the ground. Eggs: 3 to 5 bluish white, spotted, blotched and scrawled with black.

20. Black-headed Grosbeak: 8 inches. A western bird with black head, red-brown breast, black wings with white spots on them. Similar to rose-breasted of the East in habits.

BIRDS SHOWING BLUE PROMINENTLY

21. Bluebird: 7 inches. Male, blue head and back. Red breast. Female, duller in color. Song, "tru-al-ly, tru-al-ly, tru-al-ly." Nest: in holes in trees or bird-boxes. Cavity is lined with grasses. Eggs: 4 or 5 pale, greenish-blue.
22. Blue Jay: $11\frac{1}{2}$ inches. Easily identified by brilliant blue on wings and tail, black crescent on upper breast and crested head. Has musical notes in addition to the strident "jay! jay!" Nest: twigs and sticks and rootlets, rather compact, in bushes or low trees, often in young pines. Eggs: pale olive-green specked with brown.
23. California Jay: $11\frac{1}{2}$ inches. Identified by whitish underparts, and brown patch on back. Not crested. Blue on head, wings and tail.
24. Barn Swallow: 7 inches. Identified by deeply forked tail. Steel-blue, above; breast, chestnut-brown and buff. White spots on tail. A typical bird of the air. Nest: a bowl-shaped structure

of pellets of mud lined with feathers, attached to a beam in a barn or out-building. Eggs: 5 to 7 white, spotted and dotted with reddish brown.

25. Cliff Swallows: 6 inches. Steel-blue, above. Throat, sides of head and tail coverts, rufous. Identified by rufous tail coverts and buffy-white forehead. Tail, short and nearly square. Nest: a gourd-shaped structure of mud, lined with straw and feathers with opening at the side, attached under the eaves of the outside of buildings, or on the faces of cliffs. Eggs: 5 to 7 white, dotted and spotted with reddish-brown. Usually nest in colonies.
26. Kingfisher: 13 inches. Identified by big head, which is dark grayish-blue. Prominent crest. Long bill, white ring around neck. Grayish-blue back; white, underneath. Call like a policeman's rattle. Nest: at the end of a two or three foot tunnel in a sand bank. Eggs: 5 to 8, glossy white.
- 27: Indigo Bunting: 5½ inches, Male, rich blue. Tail and wing quills, very deep blue. Female, brownish above; underneath, whitish, streaked with brown. Timid but beautiful birds. Male easily identified. Nest: of grasses at low elevations in shrubs or bushes. Eggs: 4 to 5 very pale bluish white.
28. Blue-Gray Gnatcatcher: 4½ inches. Dark bluish-gray above, with black above eye, and white-bordered black tail. Underparts, white. In manner and carriage like a fairy mockingbird. Noted for beautiful nest built of plant fibers, wooly substances and cobwebs, covered with

lichens, attached to horizontal limbs of trees. Eggs: 4 to 5 bluish white specked with reddish brown.

29. Tree Swallow: 6 inches. Male, steely blue or greenish above; female, duller and usually pale gray. Both sexes are soft white below. Song a twittering like that of other swallows. Have a beautiful flight when white breasts are prominently displayed. Nest: of grass, lined with feathers in hollow trees or in bird-houses. Eggs: 4 to 5 white.

BROWN, GRAYISH AND SPARROWY APPEARING BIRDS

30. Song Sparrow: $6\frac{1}{2}$ inches. Brown back, spotted breast with heavy central blotch. Good songster. Chooses prominent perch. Nest: of grasses, bark and leaves, either on the ground or in bushes. Eggs: 3 to 5 bluish white spotted with brown.
31. English Sparrow: $6\frac{1}{4}$ inches. Ashy above, with black and chestnut stripes on back. Wings have chestnut-and-white bar. Underneath, grayish. Male has black blotch on middle of throat. Noisy call, "cheap, cheap." Very common near buildings. Nest: of straw and rubbish, piled anywhere there is a chance to build. Eggs: 5 to 7, whitish, scratched with black. They raise 3 to 4 broods a year.
32. Field Sparrow: $5\frac{3}{4}$ inches. Top of head and back, reddish-brown. Identified by reddish-brown bill and absence of black on head. Eye stands out in contrast with gray around it. Found in old pastures. Nest: a frail structure of grasses and

weeds placed on ground or in briers or weed patches. Eggs: 4 to 5 whitish, marked with reddish-brown.

33. Chipping Sparrow: $5\frac{1}{2}$ inches. Identified by chestnut crown and black line through eye. Calls "chip, chip." Very friendly. Nest: small cup-shaped structure of rootlets lined with horse-hair, placed in bushes, trees or vines. Eggs: 3 to 5 bluish green, specked with blackish brown, chiefly around the large end.
34. Fox Sparrow: $7\frac{1}{4}$ inches. Top of head and back, reddish-brown. Heavy blotch on breast. Identified by arrow-shaped markings on breast and flanks, and gray line through eye. Found feeding on ground, scratching like the chewink. Splendid singer. Nest: of grass and moss, lined with fine grass and feathers. Eggs: 4 to 5 pale bluish-green, spotted with reddish-brown.
35. Tree Sparrow: $6\frac{1}{4}$ inches. Crown, reddish-brown; back, brownish; underparts, gray. Identified by dusky spot in the center of breast. Usually found in flocks. Nest: of grasses, rootlets and hair, usually on the ground. Eggs: pale greenish blue with brown specks over the whole surface.
36. White-throated Sparrow: $6\frac{3}{4}$ inches. Crown, black with white streak through it and white stripe above eye and yellow near eye. Has square white throat patch. Calls "peabody, peabody." Nest: of leaves and grass usually on the ground, on the borders of woods, or in swamps. Eggs: 4 or 5 pale greenish blue, thickly spotted with brown.
37. White-crowned Sparrow: $6\frac{3}{4}$ inches. Crown,

black with white stripe through center and around eye. Throat ashy. Bill, reddish-brown. Most erect, aristocratic in carriage of sparrows. Found in thickets. Nest: usually on the ground under patches of bushes. Eggs: 4 or 5 whitish, profusely spotted with brown.

38. Brown Thrasher: 11 inches. Rusty red-brown above; underneath, streaked with dark brown spots. Identified especially by long tail and long bill, curved at tip. Nest: of twigs and rootlets, in hedges or thickets on or near the ground. Eggs: 4 to 5 bluish white, evenly speckled all over with reddish-brown.
39. Hermit-Thrush: $7\frac{1}{4}$ inches. Smallest of the thrushes. Upper parts, olive-brown. Tail, rufous. Note color of tail and way bird lifts it independently of any wing motion. Pale buff on throat and sides of breast. Underneath, white, Dark arrow-points on feathers of throat and rounded on breast. Our most beautiful songster. Nest: of strip of bark and leaves, on the ground among leaves or briers. Eggs plain bluish green.
40. Wood Thrush: 8 inches. Upper parts, brown. identified by golden-brown head and large, round, black spots on throat and breast which is pure white. Pure white underneath. Found chiefly near the ground. Fine songster. Nest: of grass, weeds, leaves and some mud, on horizontal branches of trees about ten feet from the ground. Eggs: 3 or 4 bluish green.
41. Wilsons' Thrush, or Veery: $7\frac{1}{2}$ inches. Uniform cinnamon-brown above, with center of throat white and buffy; breast lightly spotted with

wedged-shaped spots. Hard to find. Usually in remote places near the ground. Unique song. Also sings at night. Nest: of strips of bark and leaves on the ground. Eggs: 3 or 4, greenish blue, darker and smaller than the Wood Thrush.

42. Northern Water Thrush: 6 inches. Both sexes olive or grayish-brown above. Pale buff line over eye. Underneath, white, tinged with yellow and streaked with arrow-headed spots. Found in swamps in secluded places.
43. Yellow-billed Cuckoo: 12 inches. Distinguished from black-billed cuckoo by the yellow lower part of bill. Wings are rufous. Tail is long with outer feathers black with broad white tips. Grayish brown above; grayish white underneath. Bill as long as head. Peculiar call like a rattle. Nest: rather flat, of twigs, placed at low elevations in thickets or trees. Eggs: 3 to 5 pale, greenish blue.
44. Black-billed Cuckoo: $11\frac{3}{4}$ inches. Very much like the yellow-billed except has black bill, skin about eye is bright red, and tail feathers with only small whitish tips. Nest: often found alone on trees near water, similar to yellow-billed but eggs are smaller and darker.
45. House Wren: $4\frac{3}{4}$ inches. Upper parts, brown; underneath, whitish. Very quick, bubbling song. Erects tail, always hopping, bobbing or flitting. Never still. Nest in holes in trees, cavities, or bird-houses which they fill with twigs and dried grasses. Eggs: 6 to 8 white, minutely and thickly dotted with pinkish-brown so as to nearly conceal the ground color.

46. Carolina Wren: 6 inches. Chestnut-brown above; throat, whitish. White streak from base of bill passing over eye. Largest of wrens, fond of underbrush. Fine songster, singing the year round. Nest: of weeds, grass and trash in brush heaps, holes in trees, or bird-houses. Eggs: 5 to 7 white, specked with reddish-brown.
47. Winter Wren: 4 inches. Cinnamon-brown above; tail short and erect. Wings and tail barred with black. Always found near the ground. Good singer. Nest: of grass and weeds, lined with feathers, in brush heaps, hollow stumps, crevices or bird-houses. Eggs: 5 to 8 white, sparingly specked with reddish-brown.
- 48 Long-billed Marsh Wren: $5\frac{1}{4}$ inches. Brown above; white line over eye; tail, long and carried erect; long, slender bill. Nest: bulky and globular, of reeds and grasses, attached to cat-tails or other reeds. Eggs: 6 to 10 dark brown.
49. Seaside Sparrow: 6 inches. Upper parts, olive-gray. Identified by yellow line from eye to bill. Found in salt marshes. Nest: of seaweed and marsh grass, attached to grass stalks. Eggs: greenish white, specked with brown.
50. Henslow's Sparrow: 5 inches. Upper parts, brown. Identified by large beak. Under parts, buffy, streaked with black on breast and sides. Found on grass in meadows. Tail feathers narrow and pointed. Nest: on ground in tufts of grass. Eggs: 4 to 5 greenish-white, specked with gray.
51. Vesper Sparrow: 6 inches. Upper parts, grayish-brown; breast and sides streaked. Identified easily by outer tail feathers mostly white. Sings

somewhat like song sparrow. Nest: of grasses in weedy fields. Eggs: 4 to 5 whitish, marked and blotched with brown.

52. Ruffed Grouse: 17 inches. One of our noted game birds easily identified by ruff and black band near tip of tail. Has peculiar habit of drumming. Nest: on ground, consists principally of leaves. Eggs: 10 to 15 yellowish-white.
53. Sharp-tailed Sparrow: $5\frac{3}{4}$ inches. Found along Atlantic Coast. Yellow over eye. Spotted breast. Tail feathers, sharp. Seen creeping through salt grass. Song is a weak trill. Nest: of seaweed and marsh grass, attached to grass stalks. Eggs: greenish white, specked with brown.
54. Nighthawk: 10 inches. White bar across wing which, in flight, looks like a hole the size of a half-dollar. White throat and white band across tail. It has a forked tail. Note peculiar nasal, mouse-like cry. Skillful flyer, clearing air in circles. Continues to survive in towns, Makes no regular nest, but lays two mottled gray and white eggs on rocks, on the ground, or on gravel roofs in cities.
55. Whip-poor-will: $9\frac{3}{4}$ inches. Distinguished from nighthawk by long bristles from base of bill; black chin; the rounded tail; and their call, "Whip-poor-will." They are more nocturnal than the nighthawks. Nest on ground. Eggs: two grayish white, with delicate markings of gray, brown and lilac.
56. Horned Lark: $7\frac{3}{4}$ inches. Known by black mark across breast, and small pointed tufts of dark feathers above and behind the eyes. Grayish

above; lighter below, especially under bill. Nest: a hollow in the ground lined with grass, partially concealed by overhanging stone or sod. Eggs: 2 to 4 grayish ground color, specked and blotched with gray and brown.

57. Brown Creeper: $5\frac{1}{2}$ inches. Seen in winter. Always climbing up tree trunks. Brown, streaked with black above; white underneath. Pale rufous on rump. Tail feathers, stiff and pointed, and used as a brace. Nest: of twigs, moss and bark, behind loose bark, on dead trees or stumps. Eggs: white, specked with reddish-brown.

58. Cedar Waxwing: 7 inches. Grayish-brown head, breast and back. Dark gray wings with red wax-like appendages attached to the tips of the secondaries. Gray tail with yellowish border. Crest, conspicuous. Generally found in flocks. Nest: of twigs, mosses, string, etc., lined with fine grasses. Eggs: dull, bluish-white, specked with black.

59. Swamp Sparrow: $5\frac{3}{4}$ inches. Forehead, black; crown, chestnut. Chestnut under eye; brownish back, lighter underneath. Very quiet, found in swamps, creeping along the ground among the weeds and underbrush. Nest: of grasses on ground. Eggs: 4 or 5 pale greenish-blue, heavily blotched with shades of brown.

60. Bank Swallow: $5\frac{1}{4}$ inches. Our smallest swallow. Identified by gray band across the throat which is much lighter. Head and back, dark. Nest in colonies in holes in banks. Eggs: 4 to 7 white, laid on grass at the end of the tunnel.

61. Bobwhite: 10 inches. Best beloved bird of the

East. Its call identifies the bird. Nest: in a grass field concealed by tufts of grass or overhanging bush. Eggs: 15, white.

BIRDS THAT SHOW BLACK AND WHITE PROM-
INENTLY

62. Red-headed Woodpecker: $9\frac{1}{4}$ inches. Red head, black back, white wing patch, white underneath, white rump. Nest: in holes in trees, fence posts, telegraph poles, or bird-houses. Eggs: 4 to 6 glossy white.
63. Hairy Woodpecker: $9\frac{1}{2}$ inches. Male, black and white above, white underneath. White stripe down back. Outer tail feathers white. Scarlet nape. Female, more brownish and without red on head. Nest: in holes in trees or in bird-houses. Eggs: 3 to 6 glossy white.
64. Downy Woodpecker: $6\frac{1}{2}$ inches. Male, black above, striped with white. White underneath. White band over and under eyes. Nape scarlet. Tail, wedge-shaped. His drumming is one of the earliest spring "songs." Female without red on head. Nest: in holes in trees or bird-houses. Eggs: 4 to 6 white.
65. Yellow-bellied Sapsucker: $8\frac{1}{2}$ inches. Male, black, white and yellow above. Bright red crown, chin and throat. Breast, black in shape of crescent. Wings, spotted with white; tail, black. Female, paler with scarlet head and white throat. Nest: in holes in trees. Eggs: 4 to 7, white.
66. Chewink or Towhee: $8\frac{1}{2}$ inches. Male, black head, back and throat. Belly, white; chestnut color on sides and rump. Outer tail feathers striped with white. Female, more brownish; breast,

chestnut shading to white. Calls its name. Scratches noisily on the ground. Nest: of grass, leaves and bark, on the ground. Eggs: 4 or 5 white with reddish-brown dots over entire surface.

67. Rose-breasted Grosbeak: 8 inches. Male easily identified by black head and back, red patch on breast, white underneath. Female, brownish. Both have heavy beak. Nest: very frail, of twigs, on trees or in thickets. Eggs: blue, spotted with brown.
68. Snowflake: 7 inches. A winter bird. In summer, black and white; in winter, washed with brown. Found in flocks. Easily frightened and seen flying from one place to another. Song: a low twittering. Nest: of grass and moss, lined with feathers, sunk in moss on the ground. Eggs: 3 to 5 pale greenish-white, specked with brown.
69. Bobolink: 7 inches. Plumage of male in spring, black with yellowish patch on upper neck and edges of wing and tail feathers. Rump and upper wings, white. Tail feathers have pointed tips. Fall plumage like female, which is dull brown with light and dark dashes on back, wings and tail. Two dark stripes on top of head. Good songster. Calls its name and often lights on slender reeds in meadow. Nest: of grasses on the ground. Eggs: 4 to 6, white, heavily spotted and blotched with brown.
70. Magpie: 20 inches. A western bird easily identified. Black head and back with long black tail. White on wings and underparts. Call is a harsh "cack, cack." Nest: large, globular heap of

sticks placed in bushes or trees. Interior of nest, grass and mud. Opening on side. Eggs: 4 to 6 white, speckled with yellowish brown.

71. Black-and-white Warbler: $5\frac{1}{4}$ inches. Easily identified by black-and-white color and habit of creeping along limbs and branches of trees, either head up or down. Like a nuthatch, does not brace itself with tail. Call is weak "tsee, tsee, tsee." Nest: of grasses and strips of bark, on ground. Eggs: 4 or 5 white with a ring of reddish-brown around large end.
72. Killdeer: 10 inches. Identified by piercing call "kildee." Best known of the shore-bird family. Brownish-gray above, light below. Dark like through eye and in front of eye. White around neck. Tail feathers pale rufous at base. Nest: of grasses, on the ground. Eggs: 4 whitish, spotted and scrawled with chestnut.

BIRDS SHOWING VARIOUS SHADES OF GREEN AND OLIVE

73. White-eyed Vireo: $5\frac{1}{4}$ inches. Different from other vireos in habits. Found in lowlands and swamps. Note white eye, grayish back, white on throat, white wing bars, and yellow on sides. Song is a variety of clear whistles, given with peculiar emphasis. Nest: a structure of leaves, bark and paper, lined with fine grass and hair. Eggs: 4, white with minute brown specks.
74. Ruby-crowned Kinglet: $4\frac{1}{4}$ inches. Dark gray above, lighter below. Two white wing bars and male has erectile red feathers on the crown. Winter visitants. Has a remarkable loud, stir-

ring and beautiful warble. Nest: a ball of grass, moss and feathers, deeply cupped. Eggs: white, specked with brown.

75. Golden-crowned Kinglet: 4 inches. Male identified by orange and yellow crown bordered with black. Female has yellow crown. Dark gray above, light beneath. Light wing bars. Usually found in companies, calling "Zee, zee." Nest: a large ball of feathers and mosses, very neatly hollowed out. Eggs: 7 to 10, creamy white, profusely specked with brown.
76. Oven-bird: 6 inches. Crown, orange bordered with black. Upper parts, dark; white underparts spotted with black. A walker, generally found on the ground. Call "teacher, teacher, teacher." Also an intricate flight-song. Nest: built on ground of coarse grass, weed stalks and rootlets, roofed over, entrance on side. Eggs: 4 to 5 white, specked or spotted with brown.
77. Ruby-throated Hummingbird: $3\frac{1}{2}$ inches. Easily identified as it is our smallest bird. The wings look gossamer-like in flight. Bill long and needle-like. Back, metallic green. Underneath, light gray. Throat and breast metallic red and orange flame. Female does not have a brilliant throat. Nest: a beautiful creation of plant fibers and cobwebs, nearly covered with lichens. Eggs: two tiny white.
78. Red-eyed Vireo: 6 inches. Gray above, lighter below. Note white stripe over eye, bordered with blackish above. Eye, reddish-brown. Warbles a few notes at a time, all day long. Most common and generally distributed of our vireos. Nest: a basket woven of strips of bark

and fibers, lined with fine grass. Eggs: 4 to 5 white, with blackish-brown specks on the large end.

79. Warbling Vireo: 5 inches. Identified by gray crown with no black border. Light line over eye. Olive-green above, light on underparts. Song is more like the purple finch than the red-eyed vireo. Nest and eggs similar to red-eyed.
80. Philadelphia Vireo: 5 inches. Note yellow on breast and over eye. Usually seen high up in the trees. Not so good a singer as the red-eyed vireo. Nest at high altitudes and very hard to find. Eggs: 4 or 5 white, thinly specked with black or brown.
81. Blue-headed Vireo: $5\frac{3}{4}$ inches. Crown and sides of head, bluish-slate. White around eye and on throat. Two white wing bars. Yellow seen on flanks and back. Generally found in deep woods. A fine singer with a greater variety of notes than the other vireos. Nest: a fine, woven basket, the outside covered with spider webs and lichens. Eggs: pale, creamy white, with chestnut specks.

BIRDS SHOWING GRAY AND SLATE-COLOR

PROMINENTLY

82. Mourning Dove: $12\frac{1}{2}$ inches. Identified from other doves by dark spot on side of neck. Grayish above, pinkish below. General effect, bluish-fawn. Usually found in pairs or flocks. Nest: mere platform of twigs. Eggs: 2, white.
83. Northern Shrike: 10 inches. Gray with dark streak through eye. Dark on wings and tail. Breast barred with darker gray. Savage birds.

HOUSES FOR BIRDS

The martin is one of our most valuable birds. The food of martins consists almost entirely of insects, and they eat an incredible number of mosquitoes. Martins build in colonies. I have seen them in a rough four-room house, as well as in a magnificent structure of 200 rooms.

They are not very particular about their homes, but their houses must be on a pole at least twelve feet above the ground, and higher is even better. No



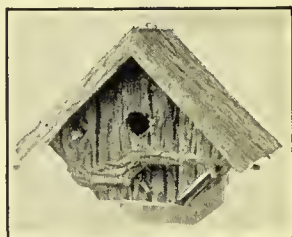
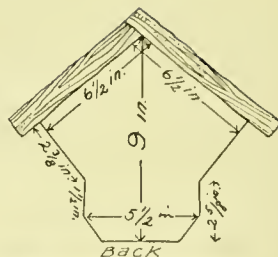
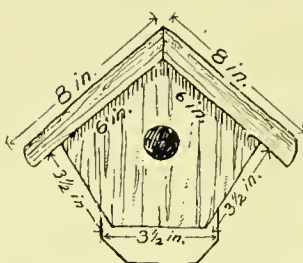
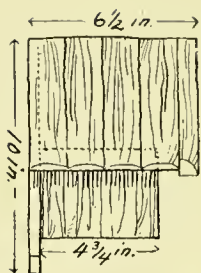
AN ELABORATE MARTIN HOUSE

trees should be near the house, as the birds fly direct from the air to their house.

Martins prefer their houses to be painted white or light gray. The rooms should be about 6 x 6 x 7 inches, with entrance holes $1\frac{3}{4}$ x $2\frac{1}{2}$ inches placed 2 inches above the floor level. A house with a porch under the openings is preferred, for if a young martin falls out, the parents are likely to pay little attention to it. An ordinary box, subdivided into rooms, can be made into a good martin house. A band of tin around the pole will prevent cats from getting to the house.

In the South, martins often build in gourds. Try to attract the martins.

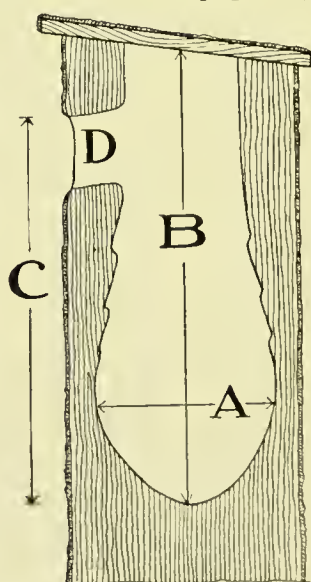
HOUSES FOR BIRDS



WREN HOUSE
(For description see page 223)



BRACKET HOUSE
(Description see page 222)



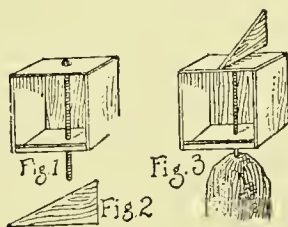
THE "FLIGHT" HOUSE
(Description on page 222)

FEEDING DEVICES

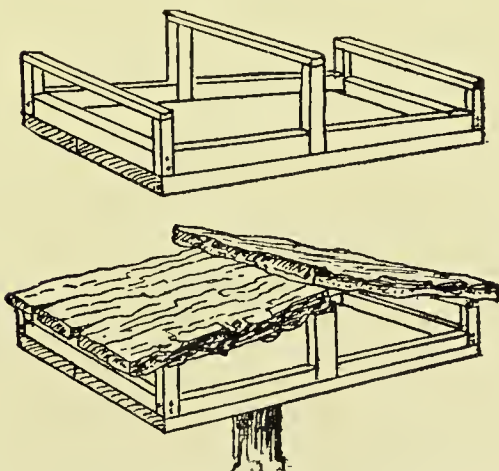


RAIL AND CORN-STALK SHELTER

These rails covered with corn-stalks make an ideal winter shelter
(See page 243)

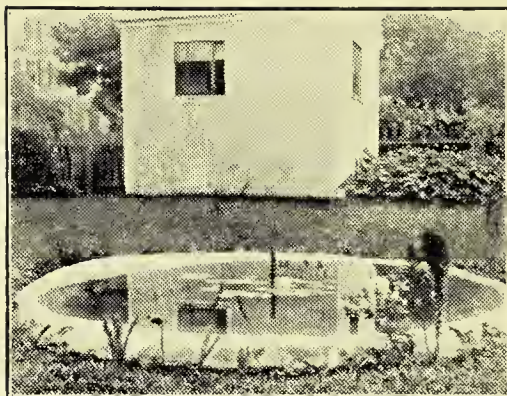


FEEDING HOUSE (See page 241)



FOOD HOUSE FOR JUNCOS AND SPARROWS (See page 242)
The top picture shows feeding-box before roof is put on

BIRD ATTRACTORS



Plenty of
fresh water

The Birds' Delight

And well-built Bird Houses



Photo by R. D. Hamilton

Three Wideawakes from Canada getting
ready for the birds

Call, similar to catbird. Nest: bulky structures of twigs and weeds, in thorny trees or bushes. Eggs: 4 to 6 grayish white with spots of light brown and darker gray.

84. Loggerhead Shrike: 9 inches. Gray above, pure white below. Black on wings and tail. Tail bordered with white. Black line through eye. Cruel bird with harsh cry. Nest: of weeds, leaves and twigs. Eggs: 4 to 7 grayish white, with shades of brown and gray.
85. Phoebe: 7 inches. Gray above, lighter below. Note how it always moves its tail upon perching, not merely up and down, but around in a sort of circle. Found around bridges and under sheds. Their notes is a jerky "phoebe." Nest: of mud, grasses and moss, plastered to sides of beams or logs under barns, bridges, etc. Eggs: 4 to 5, white.
86. Wood Pewee: 6½ inches. Distinguished from phoebe by its plaintive call "pee-a-wee," and absence of the other's tail motion. Found in dry high woods. Nest: one of the finest of all birds, built of plant fibers, woven together and ornamented with rock lichens. Eggs: 5 creamy white faintly spotted with brown.
87. Mockingbird: 10 inches. Generally dark gray above, lighter below. Outer tail feathers, white. Acts like catbird. Its song is a medley of sweet sounds and harsh unpleasant notes. Nest: of twigs and rootlets, lined with black rootlets. Usually placed in impenetrable thickets. Eggs: 4 or 5 bluish-green with blotches of reddish-brown.
88. Crested Flycatcher: 9 inches. Crest rarely con-

spicuous. Note wing coverts crossed with yellowish-white bars, and bristles at base of bill. Upper parts, dark gray; rather brownish on wings. Throat, gray; yellowish underneath. Harsh, shrill call. Seen rather high up in trees in the woods. Nest: of straw, etc., in holes of dead limbs. Generally a bit of cast-off snake-skin will be found in the nest. Will also build in bird-houses. Eggs: 4 to 6 buffy white, streaked and blotched with brown.

89. Least Flycatcher: $5\frac{1}{2}$ inches. Olive-gray above; underneath, grayish white. Note white eye-ring and white bars on wings. Jerks tail when calling "che-bec, che-bec." Nest: cup-shaped, of fibers, plant down and grasses, closely bound together. Generally found in the crotch of a tree. Eggs: 3 to 5 creamy white.
90. Olive-sided Flycatcher: $7\frac{1}{2}$ inches. Identified from other flycatchers by yellowish-white, downy feathers on flanks. Back, breast and sides one color. Takes food on the wing, like the other flycatchers. Nest: a small structure of twigs and mosses, firmly fastened to horizontal limbs of forks. Eggs: 3 to 5 creamy with large end spotted with brown and lavender.
91. Kingbird: $8\frac{1}{2}$ inches. Dark above, light below and easily distinguished by white-tipped tail. Noisy with their steely notes in summer. Deadly foe of hawks and crows. Flight, wavering and fluttering. Perches on prominent branches. Nest: a compact structure of weed stalks, grass, strings, and moss, lined with plant down and fine grasses. Eggs: 3 to 5 white, spotted with chocolate.

92. Catbird: 9 inches. Black cap. Dark slate above, chestnut patch under tail. Imitates other birds' song. Nest: twigs, grass and rootlets, lined with finer material. Eggs: 4 plain greenish-blue.
93. Chimney Swift: $5\frac{1}{2}$ inches. Deep sooty gray. Wings extend beyond tail. Tail has sharply-pointed quills. Flight is similar to bat. Utters a twittering sound. Nest: small sticks or twigs, glued to the sides of a chimney. Eggs: 3 to 5 white, being long and narrow.
94. Slate-colored Junco: $6\frac{1}{4}$ inches. Head, back, throat and breast slate-gray; white belly. Outer tail-feathers, white, which easily identifies it. Nest: of grasses on the ground, concealed by a stone, weeds or a small bush. Eggs: 3 or 4 whitish, sprinkled with reddish brown.
95. Black-capped Chickadee: $5\frac{1}{4}$ inches. Easily identified by black cap and black patch on throat. Gray back. Underneath, dirty-white. Call "chickadee-dee-dee-dee," and a musical "Phoe-be-e." Often hangs upside down. Nest: in hollow stumps, trees or bird-houses; lining it with plant down and feathers. Eggs: 5 to 8 white, sparingly specked with reddish brown.
96. Tufted Titmouse: 6 inches. Head, crested; forehead, black. Gray above, light below. Similar in habits to the chickadees. Nest: of down and feathers in hollow stumps, trees or bird-houses. Eggs: 5 or 6 white, specked with reddish-brown and lilac.
97. White-breasted Nuthatch; 6 inches. Male has black crown. Dark slate, above; white beneath, with chestnut under tail coverts. Square, short

tail with white on edges. Climbs up and down tree trunks. Has a nasal call. Nest: in cavities of hollow limbs and trunks of trees which are filled with leaves and feathers. Eggs: 5 to 8 white, thickly spotted with reddish-brown.

98. Red-breasted Nuthatch: $4\frac{1}{2}$ inches. Similar to white-breasted in habits, except they are usually in flocks. Male has reddish breast; female, lighter in color. Note dark line through eye. Nest: in hollow stumps or limbs, also in bird-houses. Fir balsam found about opening. Eggs: laid on grasses and feathers, 4 to 7 white, thickly spotted with reddish-brown.

BIRDS SHOWING BLACK PROMINENTLY

99. Purple Grackle: $12\frac{1}{2}$ inches. Male iridescent black; female, smaller and less brilliant. Iris of eye, bright yellow; tail, longer than wings and keeled in flight. Found in flocks. Walks on ground. Nest: bulky, of sticks, grasses and often mud. Eggs: 3 to 6 pale bluish-green scrawled and spotted with black.
100. Red-winged Blackbird: $9\frac{1}{2}$ inches. Male black with scarlet shoulders, edged with yellow. Female; feathers specked with brown, black, gray and orange. Chatters when in flocks. Call, "conquer-ee." Nest: deep, of grasses and rushes beautifully woven, suspended from the rim when found in bushes. Usually over swamps. Eggs: 3 to 5 bluish white, scrawled with blackish.
101. Cowbird: $7\frac{3}{4}$ inches. Male; black, with head, neck and breast brown. Female, duller and streaked. Walks on ground among cattle. Our

only bird that lays its eggs in other birds' nests, usually in warblers', sparrows', and vireos' nests. Eggs: white, specked with brown or gray. Number unknown.

102. Purple Martin: $7\frac{3}{4}$ inches. A bird of the air. Always nests in colonies. Male, rich glossy black. Wings, longer than forked tail. Female, more brownish; and grayish below. Song, rippling and very soft and sweet. Nest: of straw, paper, rags, etc., in bird-houses, gourds, or gables. Eggs: dull white.
103. Common Crow: 19 inches. All black. Sits in prominent places. Call, "caw, caw." Nest: very bulky, of sticks, lined with bark. Eggs: 4 to 6 bluish-green, thickly marked with brown.
104. Fish Crow: 16 inches. Smaller than the American crow and looks thinner. Common only on Atlantic coast. Its call is "cac" or "car" rather than the other's "caw." Nest: big and bulky. Eggs: similar to American crow.
105. Starling: $8\frac{1}{2}$ inches. Adults easily identified by the short tail, yellow bill, and metallic green and purple-black plumage, spotted with buff and white. Some are excellent mimics and good songsters, and many have a clear, loud whistle. Nest: anywheres and often in colonies, using a wide variety of materials. Eggs: 4 to 6 pale blue, unspotted.
106. Rusty Blackbird: $9\frac{1}{2}$ inches. Male, glossy black with rusty-brown patches. Female, grayish. Identified by rusty appearance and pale yellow eye. Song, rather squeaky.

CHAPTER XL

NICKNAMES

OH yes! birds have many names besides their right ones. Look at the beautiful bluebird. There he sits on a limb near his nest singing “tru-al-ly, tru-al-ly.” His name is really “*Sialia Sialis*.” We call him “bluebird” but many little folks and big folks call him “Blue robin.”

BIRDS OF MANY NAMES

ACADIAN FLYCATCHER	Small pewee; small green- crested flycatcher; hick- up
AMERICAN ROBIN	Red-breasted thrush; robin- redbreast
AMERICAN PIPIT	Titlark; brown lark
AMERICAN GOLDFINCH	Wild canary, yellowbird, thistlebird
AMERICAN RAVEN	Northern raven
ACADIAN OWL	Saw-whet owl
BARRED OWL	Rain owl
BOHEMIAN WAXWING	Black-throated waxwing, Lapland waxwing, silk- tail

BLUEBIRD	Blue robin
BELTED KINGFISHER	The halcyon
BLUE-GRAY GNATCATCHER .	Sylvan flycatcher
BROWN THRASHER	Brown thrush, ground thrush, red-thrush, brown mockingbird, French mockingbird, Mavis
BALTIMORE ORIOLE	Golden robin, firebird, Eng- lish robin, golden oriole, hang-nest
BLACKBURNIAN WARBLER ..	Torchbird, orange-throated warbler, hemlock warbler
BLACK-BILLED CUCKOO	Rain crow
BANK SWALLOW	Sand martin, sand swallow
BOBOLINK	Reedbird; Maybird; mead- ow-bird; American orto- lan; ricebird; butterbird; skunk blackbird
BLACK-AND-WHITE CREEP-	Varied creeping warbler;
ING WARBLER	whitepoll warbler; black- and-white creeper
CAROLINA WREN	Mocking wren
CATBIRD	Black-capped thrush
CHESTNUT-SIDED WARBLER .	Bloody-sided warbler
CLIFF SWALLOW	Eave swallow; crescent swallow; rocky mountain swallow
CEDAR BIRD	Cedar waxwing; cherry- bird; Canada robin; rec- ollet; quaker-bird
CHIPPING SPARROW	Chippy; chip-bird; hair- bird; social sparrow

- CARDINAL GROSBEAKCrested redbird; cardinal
bird; Virginia redbird;
Virginia nightingale
- CHIMNEY SWIFTChimney swallow; American
swift
- CHICKADEEBlack-capped t i t m o u s e ;
Black-cap tit
- CANADA JAYWhisky Jack; moose-bird;
meat-bird; Venison heron;
grease-bird; camp rob-
ber; Canadian carrion-
bird
- CHEWINKTowhee; towhee bunting;
towhee ground finch;
ground robin; grasel
- CROWCorn thief
- COWBIRDBrown-headed oriole; cow-
pen bird; cow blackbird;
cow hunting
- ENGLISH SPARROWHouse sparrow
- FIELD SPARROWField bunting; bush spar-
row; wood sparrow
- FOX SPARROWFox-colored sparrow; foxy
finch
- FLICKERGolden-winged woodpecker;
clape; wake-up; pigeon
woodpecker; yellowham-
mer; yarup; high-hole;
yellow-shafted woodpeck-
er
- GREAT HORNED OWLHoot owl
- GRASSHOPPER SPARROWYellow-winged sparrow

GOLDEN-CROWNED KINGLET.	Golden-crowned goldcrest; fiery-crowned wren
HORNED LARK	Shore lark
HERMIT THRUSH	Swamp angel; little thrush
JUNCO	Snowbird; slate-colored snowbird
KINGBIRD	Bee martin; tyrant fly- catcher
LEAST FLYCATCHER	Chebec
LONG-EARED OWL	Cedar owl
LAPLAND LONGSPUR	Lapland snowbird; Lapland lark bunting
MAGNOLIA WARBLER	Black-and-yellow Warbler; blue-headed yellow- rumped warbler; spotted warbler
MARYLAND YELLOWTHROAT.	Black-masked ground war- bler
MEADOWLARK	Field lark; Oldfield lark
MOURNING DOVE	Carolina dove; turtle dove
MYRTLE WARBLER	Yellow-rumped warbler; myrtle bird; yellow- crowned warbler
NORTHERN WATERTHRUSH .	Aquatic wood wagtail; aquatic thrush; New York water thrush
NORTHERN SHRIKE	Butcher-bird; nine-killer
NIGHTHAWK	Bull-bat; Mosquito hawk; long-winged goatsucker; pisk; piramidig; night- jar

ORCHARD ORIOLE	Orchard starling, orchard hang-nest
OVENBIRD	Golden-crowned thrush; the teacher; wood wagtail; golden-crowned accenter
PHOEBE	Dusky flycatcher; bridge pewee
PURPLE GRACKLE	Crow blackbird; maize thief; keel-tailed grackle
PINE GROSBEAK	Pine bullfinch
PURPLE FINCH	Purple linnet
PARULA WARBLER	Blue yellow-backed warbler
PINE SISKIN	Pine finch; pine linnet
RED-EYED VIREO	The preacher
REDSTART	Yellow-tailed warbler
REDPOLL	Redpoll linnet; little snow- bird; lesser redpoll
RED-HEADED WOODPECKER .	Tri-color; red-head
RUSTY-BLACKBIRD	Thrush blackbird; rusty grackle; rusty oriole; rusty crow; blackbird
RED-WINGED BLACKBIRD . .	Swamp blackbird; red- winged oriole; red-winged starling
RED-BREASTED NUTHATCH .	Canada nuthatch
RUBY-CROWNED KINGLET ..	Ruby-crowned wren; ruby- crowned warbler
SNOWFLAKE	Snow bunting; whitebird; snowbird; snow lark
SUMMER TANAGER	Redbird; smooth-headed redbird

SCARLET TANAGER	Black-winged redbird; fire-bird; pocket-bird; Canada tanager
SCREECH OWL	Red owl; mottled owl; gray owl
SAVANNA SPARROW	Savanna bunting
SWAMP SONG SPARROW	Swamp sparrow; marsh sparrow; red grassbird; swamp finch
SEASIDE SPARROW	Meadow chippy; seaside finch
TREE SPARROW	Canada sparrow; winter chippy; tree bunting; winter chip-bird; Arctic chipper
TREE SWALLOW	White-bellied swallow
TUFTED TITMOUSE	Crested titmouse; crested tomtit
VESPER SPARROW	Bay-winged bunting; grass-finch; grass-bird
WHITE-THROATED SPARROW	Peabody-bird; C a n a d a sparrow
WHITE-BREASTED NUT-HATCH	Tree-mouse; Devil down-head
WILSON'S THRUSH	Veery; tawny thrush
WOOD THRUSH	Song thrush; wood robin; bellbird
WILSON'S WARBLER	Blackcap; Wilson's fly-catcher; green black-capped warbler

YELLOW-BELLIED WOOD-

PECKER Sapsucker

YELLOW REDPOLL WARBLER. Yellow palm warbler

YELLOW WARBLER Summer yellowbird; golden
warbler; yellow poll

YELLOW-BREASTED CHAT... Yellow mockingbird

YELLOW-BILLED CUCKOO .. Rain crow

GAME, SEA AND SHORE-BIRDS

AMERICAN HERRING GULL .. Big gull, winter gull

AMERICAN MERGANSER Goosander, sheldrake, fish-
duck

AMERICAN SCAUP DUCK Blue-bill, big-black-head

AMERICAN GOLDEN-EYE ... Whistler

AMERICAN SCOTER Booby; sea coot

AMERICAN BITTERN Indian hen

AMERICAN EGRET Large white crane

AMERICAN COOT Crow duck

AMERICAN WOODCOCK Bog-sucker; wood-snipe

BARTRAMIAN SANDPIPER .. Gears plover; field plover,
upland ploverBLACK-BELLIED PLOVER ... Bull-headed plover; whis-
tling field plover

BLACK-CROWNED NIGHT

HERON Squawk, night-hen

BONAPARTE'S GULL Little gull

BLACK TERN Short-tailed tern

BLACK DUCK Dusky duck, black mallard

COMMON TERN Sea swallow; Wilson's tern

CLAPPER RAIL Mud hen

GREAT BLUE HERON	Big Crane
GREEN HERON	Shite-poke, chalk-line, fly-up-the-creek
HORNED GREBE	Dipper duck, little hell diver, little fish duck
KING RAIL	Big red rail
LOON	Great northern diver
OLD-SQUAW	Long-tailed duck
PIED-BILLED GREBE	Little dipper, Hell diver
PINTAIL	Sprig-tail
STORMY PETREL	Mother Carey's chicken
SHOVELLER	Spoonbill
SNOWY HERON	Little white egret
SURF SCOTER	Surf duck, booby ; sea coot
SEMIPALMATED PLOVER . . .	Ring-neck, ring plover
TURNSTONE	Calico-back ; calico-snipe
VIRGINIA RAIL	Little red rail
WILSON'S SNIPE	English snipe ; jack-snipe
WOOD DUCK	Summer duck, acorn duck

CHAPTER XLI

BIRD GAMES AND BIRD POEMS

TRY these at your Friday afternoon programs, or at your Bird Club meetings.

GAME NO. 1

This bird game was originated by a Canadian bird lover, Edward Still. Each line can be answered by the name of a bird.

One bird suggests the action of a thief.
Another, losing mate, expires of grief.
A household pet gives the name to number three.
And number four is styled the vainest one can see.

My fifth an animal complaint suggests.
My sixth the color of a parson's vest.
The name of number seven rhymes with hail.
While the eighth the sailors say forbodes a gale.
Nine on German helmets takes his perch.
Ten is a dignitary of the Roman church.
Eleven, a useful bird where flies abound.

And twelve a croaker one hates having 'round.
Thirteen, a predatory cannibal of wanton will.
Fourteen, marsh loving little fellow long of bill.
Fifteen, beloved of poets, easy of rhyme.
My last, blest home beyond the bounds of time.

ANSWERS TO BIRD GAME NO. 1

- | | |
|-------------------|-----------------------|
| 1. Robin. | 9. Eagle. |
| 2. Love-bird. | 10. Cardinal. |
| 3. Catbird. | 11. Flycatcher. |
| 4. Peacock. | 12. Raven. |
| 5. Thrush. | 13. Butcher bird. |
| 6. Blackbird. | 14. Snipe. |
| 7. Quail. | 15. Dove. |
| 8. Stormy Petrel. | 16. Bird of Paradise. |

GAME NO. 2

This game is reprinted from the Oklahoma Bird-Day Book, published by the State Game Warden, J. B. Doolin. Every line can be answered by the name of a bird.

1. There's a bird whose name tells if he flies fast or slow,
2. And one which boys use when with long strides they go.
3. There is one that tells tales, although he can't sing,
4. And one who flies high, but is held by a string.
5. By one a high rank in the army is held,

6. There's another whose name with one letter is spelled.
7. There is one that a farmer in harvest would use,
8. And one you can easily fool if you choose.
9. What bird, at dessert, is it useful to hold?
10. And which in the chimney place oft hung of old?
11. Which bird wears a bit of the sky in its dress?
12. Which one always stands in the corner chess?
13. There is one built a church, of London the pride;
14. We have one when we talk with a friend by our side.
15. What bird would its bill find useful at tea?
16. And which would its tail use to steer us at sea?
17. Which proudly a musical instrument wears?
18. And which the same name as a small island bears?
19. Which bird is called foolish and stupid and silly?
20. And which always wanting to punish poor Billy?
21. Which bird is an artisan, works at its trade?
22. And what is the stuff of which flags are made?
23. One, we're told by the poet, at Heaven's gate sings,
24. And there's one which, in Holland, the new baby brings.
25. What bird have we with us in eating and drinking?
26. One, used for a fence, you can say without thinking.
27. What bird is a scoffer, a scorner, a jest?
28. What one is too lazy to build her own nest?
29. From a high wind at evening one name is inferred,
30. Guess all these, you're as wise as Minerva's own bird.

ANSWERS TO GAME NO. 2

- | | |
|-------------|--------------|
| 1. Swift. | 4. Kite. |
| 2. Stilt. | 5. Adjutant. |
| 3. Tattler. | 6. Jay. |

WATCH FOR THESE



The swallows convention, taken during migration by Cornelia Clarke



The quail and the grosbeaks are the great destroyers of the potato beetle

Photo by H. T. Middleton

The female grosbeak



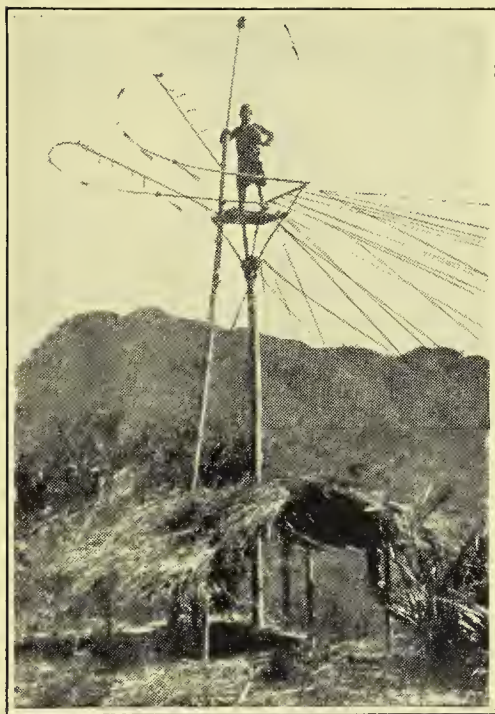
Photo by L. M. Chace

Young Mourning Doves on Nest



How the author attracted bluebirds to his home

PROTECTING CROPS FROM BIRDS

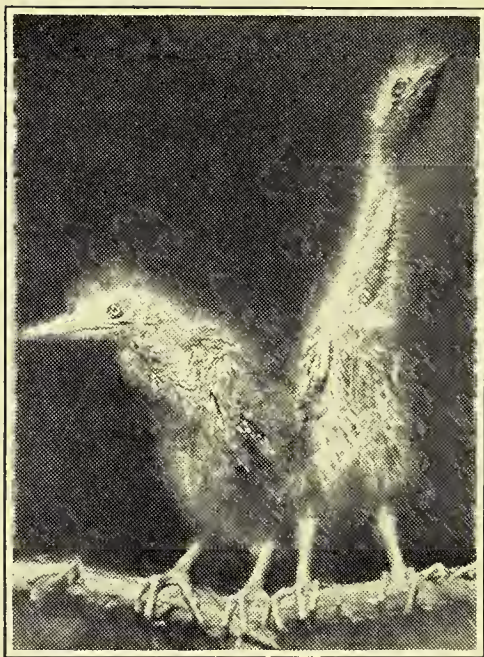


THE BIRD-CHASER

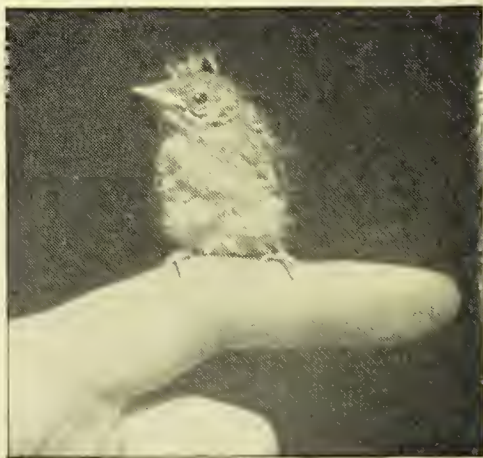
A method of frightening birds which is cheap and gets results is used in Sumatra by the native farmers. It is not only unique, but something similar could be used with satisfaction in North America.

The Sumatran native, when his rice crop begins to mature, is threatened with myriads of birds of various size. To keep them off the fields he erects a high, strong pole at the edge of the ground to be protected. At the top of the pole he builds a well-braced platform with a railing. To this is fastened two or more bamboo rods. From these, long strong cords are carried in all directions over the field and fastened to upright flexible stakes driven at various spots about the boundaries, so that the field is covered almost like a net. To the cords are attached grotesque paper representations of the spirit of the forest, a deity of the Sumatrans who is placated with sacrifices of pigs and chickens. In addition, numerous small wooden bells and wooden rattles are attached to the cords. On the platform, from morning till night, one of the farmer's little sons stands on guard, and whenever he sees a flock of birds approaching he strikes the bamboo poles smartly, thereby setting in motion the bells and rattles and paper images. The bells and rattles give off a fairly loud discordant sound, and this and the fluttering of the images never fails to protect the field.

PHOTOGRAPHING BIRDS



The green heron growing up



Birds make good models

- | | |
|------------------|-------------------|
| 7. Thrasher. | 19. Loon. |
| 8. Gull. | 20. Whippoorwill. |
| 9. Nutcracker. | 21. Weaver. |
| 10. Crane. | 22. Bunting. |
| 11. Bluebird. | 23. Lark. |
| 12. Rook. | 24. Stork. |
| 13. Wren. | 25. Swallow. |
| 14. Chat. | 26. Rail. |
| 15. Spoonbill. | 27. Mockingbird. |
| 16. Rudder-duck. | 28. Cuckoo. |
| 17. Lyre. | 29. Nightingale. |
| 18. Canary. | 30. Owl. |

GAME NO. 3. WHAT BIRD IS THIS?

This game is interesting and educational. There are thirty birds represented and two or three can be given to class or club each week.

1. My nest is built in the top of tall trees, in the woods.

It is very large, made of branches, lined with finer twigs, bark, etc.

My eggs are nearly as large as a hen's egg. They are light green, spotted with dark green, brown or black.

My color is shiny black.

My call is "Caw, caw, caw."

I stay here all the year; but in winter I prefer a sheltered place, like the woods.

My food is whatever I can get most easily. I like bugs, worms and raw meat. When I can not get these I will eat young birds, eggs or grain.

My size is nineteen inches.

My name is (Crow)

2. My nest is found in a hole in an old tree, preferably an apple tree. I put a few chips in the bottom to make it soft.

My eggs are white.

I am black and white striped. I have a broad white stripe down my back and nearly my whole belly is white.

On the back of my head is a bright red patch.

I can not sing, but I have a little call note. Usually when I wish to call my mate I turn drummer, and peck very hard and fast on the stump of an old limb.

I stay around your home all winter, for I find plenty of food there. My food is bugs and worms, which I find by boring into the bark of trees.

My size is six inches.

My name is (Downy Woodpecker)

3. My nest is made of grass and feathers, in a sheltered spot beneath eaves or other covering.

My eggs are whitish brown with gray spots.

I have a gray head with reddish brown each side, brown and black back, brown tail, throat black at center and white each side, and white belly.

My call is a quarrelsome chatter.

I stay here the year around.

I eat wheat, oats, rye, barley and corn. In winter when I can not get these, I eat the seeds of weeds.

My size is six and one-quarter inches.

My name is (English Sparrow)

4. My nest is made of grass, on the ground near a bush or something that will hide it from view.

I do not build this nest near your home as so many birds do, but go way up in Canada where it is cooler.

My eggs are white, specked with brown.

My color is grayish black all over except my belly which is white. I also have white feathers on each side of my tail which show only when I fly.

My song is just a little trill. My comrades and I like to sing together.

You will see me only during March and April, when I am on my way to Canada, and again during October and November, when I am flying south for winter. I eat all kinds of seeds. I can destroy more weeds than a dozen boys could pull in a day, for I eat the weed-seeds.

My size is six and one-quarter inches.

My name is (Slate-colored Junco)

5. I build my nest in a hollow stump near the ground.

My eggs are white with a few specks of reddish brown.

My back is gray. The top of my head and throat are black. The rest of my body is grayish white.

My song sounds like this—"Chick-a-dee-dee-dee."

I stay around your orchards and other trees all winter and eat the worms and worm eggs that I find on the twigs and buds. If your father had enough of my family in his orchard he would never need to spray it.

I am five and one-quarter inches long.

My name is (Chickadee)

6. My nest is built in a hole in a tree quite a distance from the ground. I fill the bottom of this hole with leaves and sometimes line it with feathers.

My eggs are white, spotted with brown.

My back is blue-gray, with some white on my tail.
The top and back of my head is black.

My throat, breast and belly are white.

I have a queer little call that sounds like "Hank,
hank."

I stay around your house and orchard all winter.
I eat the worms and worm eggs that I find on the
trunks of trees. I almost always hunt with my
head downward.

My size is six inches.

My name is (White-breasted Nuthatch)

7. My nest is made of rootlets and grass in a hole
in an apple tree, or in a bird-house.

My eggs are pale blue.

My color is bright blue on back, wings and tail. I
have a reddish brown throat, shading into a
white belly.

My call is a mellow warble, always happy.

You may look for me in the northern states around
the first week of March.

I eat worms and bugs.

My size is seven inches.

My name is (Bluebird)

8. My nest is made of woven grasses and rushes on
or near the ground in swamps.

My eggs are bluish white with a bit of black near
the large end.

My color is black with scarlet and buff-colored
spots on the shoulder of each wing.

My call is pleasant to hear. It sounds like this:
"Onk-err-ee."

You may look for me near ponds and swamps
about March 1.

I eat grains and other seeds.

My size is nine and one-half inches.

My name is (Red-winged Blackbird)

9. My nest is made of mud and grass in a tree or under the eaves of a building.

My eggs are greenish blue.

My color is slate-gray on the back, with reddish-brown underneath.

My call is "Cheer up, cheer up."

I come north about the middle of March.

I eat worms and bugs, also cherries and berries.

My size is ten inches.

My name is (Robin)

10. My nest is built in a hole in a tree, sometimes as much as sixty feet from the ground.

My eggs are white.

My general color is brown specked. The top of my head is bluish gray, with a red spot just at the back. I have a black crescent across my breast and a touch of black at each side of my long bill. At the sides of my wings and tail are yellow feathers that show when I fly. I also show a spot of white on my back when flying.

My song is very quick and loud. It sounds something like an old hen beginning to cackle, "Cuk, cuk, cuk."

I come to your vicinity very early in the spring.

My food is mostly ants.

My size is thirteen inches.

My name is (Flicker)

11. My nest is small and round, mostly made of horse-hair with a few grasses on the outside. You will find it in bushes and vines or on low branches of trees.

My eggs are a light greenish blue with dark markings around the larger end.

My head is chestnut-brown on top with a brown streak through each eye. My back and wings are brown streaked and my breast is grayish white.

My call is a quick "Chip, chip, chip, chip, chip."

I come north about the first week in April.

I eat all kinds of seeds. You will see me eating dandelion seeds on your front lawn.

I am about five and one-quarter inches long.

My name is (Chipping Sparrow)

12. My nest is made of grass on the ground, well covered, if possible.

My eggs are white, specked with brown.

My back and tail are brown, about the color of dead grass. My throat and breast are yellow, with a black crescent across the front. When I fly I show white under my tail and wings.

My call is "Twee-twer." I often call from fenceposts or perched on a bush.

I come north about the middle of April.

I eat insects and weed seeds.

My size is ten and one-half inches.

My name is (Meadowlark)

13. My nest is made of mud, lined with feathers. You will always find it on the rafters of barns.

My eggs are white, dotted with brown.

I am a bright blue on the back, with white feathers near the tip of my tail. My tail is fork-shaped, so that the outer feathers are much longer than those at the center. The very top of my head and throat are a bright reddish brown, shading back into pale buff underneath.

My song is a rapid twitter.

I do not come until quite late spring, though sometimes in April.

I eat worms and bugs.

My size is seven and one-quarter inches.

My name is (Barn Swallow)

14. My nest is in a hole in a tree.

My eggs are white.

My color is hard to describe, but if you listen you can not fail to know who I am. The top of my head and throat are bright red. My back and wings are black and white striped.

Below the red of my throat comes a black strip and below that a yellow belly.

My call is loud and whining.

I come to you in the spring.

I eat worms and bugs which I get by boring into trees. You can often tell where I have been working by the sap running from the holes I have made.

My size is eight and one-half inches.

My name is (Yellow-bellied Sapsucker)

15. My nest is made of grass with a few twigs. You will find it among the weeds in a pasture, but not very well covered. My eggs are pale bluish gray with brown spots.

My color is brown striped. I have a bright reddish-brown shoulder. My throat is white, but my breast is striped. When I fly I show a white feather at each side of my tail.

My song begins with two short notes followed by a whistle.

I sing most just at sunset.

I come north early in April and stay late till fall.

In spring and summer I eat worms, bugs, crickets and grasshoppers. In winter I eat seeds and dry grass.

My size is six inches.

My name is (Vesper Sparrow)

16. My nest is made of grass, on the ground under little tussocks. You will have to hunt hard before you can possibly find it.

My eggs are white with irregular brown blotches on them.

My color is black, spotted on the back with white and buff.

My song is sweet and rippling.

I like all kinds of insects.

My size is seven and one-quarter inches.

My name is (Bobolink)

17. My nest is made of grass, sometimes on the ground and sometimes in low bushes.

My eggs are bluish white with dark spots.

My color is brown and white, marked with a brown spot at the center and each side of my streaked breast.

My song is like three short call notes with a warble at the end.

You can look for me in the North about the first of March.

I eat seeds of all kinds and crumbs that you might throw out.

My size is six and one-quarter inches.

My name is (Song Sparrow)

18. My nest is made of plant fibers. I like to build it on a hanging willow over a creek or pond.

My eggs are bluish green, spotted with brown.
My color is greenish yellow on the back, with
bright yellow marked with orange brown.

My song is a sharp warble.

My food is seeds.

I come north in early spring.

My size is five inches.

My name is (Yellow Warbler)

19. My nest is made in a hole in a tree, fence-post or
telephone pole.

My eggs are glossy white.

My head and throat are bright red. My breast is
white.

My wings and tail are black, with white bars on
the wings.

My call is loud and whining.

I come north about the last of April.

I eat insects, grubs and some fruit.

I am larger than ordinary birds, for I measure nine
and one-half inches.

My name is (Red-headed Woodpecker)

20. My nest is made of sticks and twigs up in pine
trees.

My eggs are pale bluish gray with a few black
streaks.

My color is purple on the head, with a greenish
blue back that glistens in the sun. The rest of
my body is black.

My call is a short, harsh, squeaky note.

I come early in the spring.

I eat grain, bugs and worms.

My size is twelve inches.

My name is (Purple Grackle)

21. My nest is made of grass, lined with thistle-down.
I usually build near the water.
My eggs are pale blue.
My color is mostly yellow with a black cap on top
of my head and black and white striped wings
and tail.
My song is a sweet twitter.
I come in early spring.
My size is five and one-quarter inches.
My name is (Goldfinch)
22. My nest is made of twigs and string, lined with
soft grass.
My eggs are bluish white specked with white.
The main part of my body is a reddish brown
with a top-knot. My wings are gray with orange
tips. My tail is gray with yellow tip.
My song is a queer hissing sound.
I come to you in rather late spring.
I eat fruit mostly, and am especially fond of
cherries.
My size is seven inches.
My name is (Cedar Waxwing)
23. My nest is made of twigs and grass and is lined
with fine roots.
My eggs are greenish blue.
I am a very dark gray with black cap. When I
fly I show a chestnut brown patch under my tail.
I can sing like almost any other bird. I have
great fun imitating other birds and fooling peo-
ple. My regular call is "Mew, mew."
I come to you in spring.
I eat worms and bugs.
My size is nine inches.

My name is (Catbird)

24. My nest is very different from the nest of any other bird you have heard about. It hangs from the end of elm and maple branches. It is suspended by three strings. The main part of it is like a deep cradle made of string and hair.

My eggs are white scrawled with dark brown.

My head, throat, and part of my back are black. The rest of my back and breast are orange color. My wings are black with a touch of orange and white. My tail is black with two orange spots.

My song is a clear, beautiful whistle or warble.

I do not come to you until about the middle of

May, when the peach trees begin to blossom.

I eat worms and bugs.

My size is seven and one-half inches.

My name is (Baltimore Oriole)

25. My nest is built in the woods, of bark and rootlets, and is lined with hair.

My eggs are cream white with reddish brown spots.

My color is grayish blue above with black throat and sides. I have a white spot on each side of my tail on each wing. My belly is also white.

My song is a whistling warble.

A few of my family make their nests in the Northern States, but most of us go farther north, so you only see us in spring and fall.

I eat seeds and bugs.

My size is five and one-quarter inches.

My name is (Black-throated Blue Warbler)

25. My nest is made of twigs and roots in the lower branches of trees.

My eggs are bluish green with brown spots.

My color is bright scarlet, with black wings and tail.

My call is "Chip-churr-ir."

I come north in the spring.

I eat insects, seeds and berries.

My size is seven and one-half inches.

My name is (Scarlet Tanager)

27. My nest is made of straw, grass, twine, mud, and is lined with feathers. I often build it near houses, but mostly in woods.

My eggs are greenish blue.

My color is cinnamon brown back, wings and tail, with top of my head brighter brown. My whole breast is white with vivid black spots.

My song is flute-like and lively. You will hear me singing in the woods or along bushy roadsides.

I come to you in spring.

I eat worms and bugs.

My size is eight inches.

My name is (Wood Thrush)

28. My nest is made of milkweed fiber and spider-webs and is lined with grasses and horsehair. I build it in low trees.

My eggs are creamy white, specked with lavender and brown.

My color is black on the back and throat, with six bright orange patches, one on each side of the tail, one on each wing and each side of the breast. My belly is white. You will know me by the fan-like way I spread my tail and wings and flutter about.

My song is "Che-wee, che-wee, che-wee."

I come north about the last of April.

My size is five and one-half inches.

My name is (Redstart)

29. My nest is made of grass, sticks and string, in fruit or other trees.

My eggs are cream-white with brown spots.

My general color is gray, with a small orange patch on my forehead. My throat and breast are grayish white and I have a row of white feathers across the end of my broad, blunt tail.

My call is harsh and shrill. It sounds like "Thsee, thsee, thsee."

I come north in May. You may see me on fence-posts and wires most often.

I eat insects and worms.

My size is eight and one-half inches.

My name is (Kingbird)

30. My nest is so small you would hardly see it, but think it a bit of moss on the branch where it is made. It is made of plant fibers and cobwebs.

My eggs are white and very small.

My back, wings and tail are an olive-green, with a deep red throat. My breast is pale greenish white. My bill is very long and slender.

You will know me by the buzzing of my wings rather than by any song.

I eat insects and also honey from flowers.

My size is three and one-half inches.

My name is (Ruby-throated Hummingbird)

GAME NO. 4

By CARL SCHURZ LOWDEN

Every line can be answered by the name of a bird.

1. A member of royalty, but he hates hawks and crows.
2. This bird signifies American liberty and appears on many of our coins.
3. Though he displays the colors of Germany, he knocks on wood.
4. This bird wears a mustache and upholds corporal punishment.
5. And this one lives in the place Santa Claus is reputed to use in entering a home.
6. Though not much larger than a bee, he buzzes like one and is the tiniest of his tribe.
7. Which bird is a dignitary in the Roman Catholic Church?
8. The nickname of Robert, an exclamation and a part of a chain.
9. Which feathered friend weaves a basket nest that sways with every breeze?
10. Which sparrow wears a snowy cap marked with two black stripes?
11. Which bird reminds you of a baker?
12. Who sings about witches and appears in a black mask?
13. The color of a flame, and to begin.
14. Which musician prefers medleys and possesses a feline name?
15. A recluse.
16. Who says "Peter," usually three times before stopping?
17. Who advocates the slaughter of antlered animals?
18. To cower or fail in spirit.
19. A pasture and a game or frolic.
20. He carries the sky on his back and the brown earth on his breast.

ANSWERS TO GAME NO. 4

1. Kingbird
2. Eagle.
3. Red-headed Woodpecker
4. Whippoorwill.
5. Chimney Swift.
6. Hummingbird.
7. Cardinal.
8. Bobolink.
9. Baltimore Oriole.
10. White-crowned Sparrow.
11. Ovenbird.
12. Maryland Yellowthroat.
13. Redstart.
14. Catbird.
15. Hermit Thrush.
16. Tufted Titmouse.
17. Killdeer.
18. Quail.
19. Meadowlark.
20. Bluebird.

*Bird Poems Selected from "The Farm
Journal"*

SIGNALS

When the bluebird spreads her banner
Of red and white and blue,
And the flicker strikes his hammer

With a stroke both firm and true
'Gainst the oak tree in the clearing;
When the frogs peep by the pool
Where the children idly linger
As they wander home from school:—
It is time to wait and listen,
Nature's heart will soon expand,
Flooding with her radiant beauty
All the erstwhile barren land.

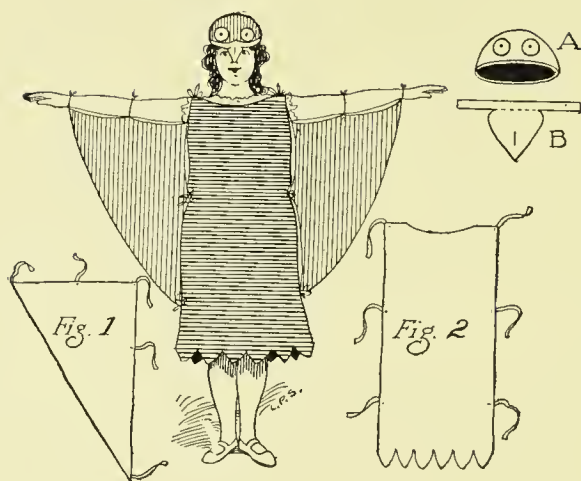
Helen M. Richardson.

THE CONCERT

At break of day this morning
I heard a concert free,
By a band all snugly hidden,
Up in my wild-plum tree.
From the white boughs bloom-laden,
The orchestra unseen,
First tuned each golden instrument
Behind the fragrant screen.

A flute, in tones of silver,
Shrilled sweet; I whispered: "Hark!
I know that reedy melody—
It is a meadowlark."
Then came a woodland symphony
In liquid undertone.
I smiled—a thrush was striving
To be a band alone!

COSTUME FOR BIRD PARTY



Use ordinary cheese-cloth in various colors, or colored chintz.

These costumes are easy to make, cost but a trifle and are extremely effective. Same design used for both boys and girls. The girls should wear light dresses, with or without sleeves, and the boys light shirts and knickerbockers.

For wings: Use a triangle-shaped piece of cheese-cloth, as per Fig. 1. For size, measure length of arm and down to three inches above the knee. Hem all edges and attach tape as shown in sketch. Tie wings to arms, waist and points above knee.

Front and back (to be worn over dress or suit): Use oblong pieces of goods for both front and back as per Fig. 2. Measure length from neck to knee. The width should be such as not to span. Cut away goods at neck and scallop the bottom. Hem all edges and attach tape as shown in sketch. For girls, the neck in front may be gathered, but do not use gathers in the boys' costumes. The front and back are fastened together by tying the tapes.

Hat: Cut the brim from an old felt hat. Make two holes for eyes. Cover these eyes with white or yellow paper, and ink a spot in the center of each eye. (See sketch A.)

For beak, take yellow cardboard $6\frac{1}{4} \times 11$ inches. Cut as shown in sketch B, making band one and a quarter inches wide; beak, from band, to be five inches long and five inches wide. Bend band at right angle from beak as shown by dotted line. Fasten band around the rim of the crown, and the hat is complete. The hat may be covered with cheese-cloth to add to the effect.

A nuttail from the covert next
Sent ringing to the blue
A chime of bell-like harmony,
Finished and fine and true.
A catbird's pipe rose, whining first,
Then, in a silver spray,
A rain of notes as radiant
As the sun's first golden ray.

Just then the concert ended,
And I looked up to see
One small gray bird go flitting
Forth from my wild-plum tree.
Just one—but he had made them all,
The sweet notes that I heard—
The minstrel with a magic throat,
The Master Mocking-Bird!

Anne McQueen.

GOOD-MORNING MR. MOCKING-BIRD

Good-morning, Mr. Mocking-Bird.
"Your own good-morning, sir, to you!"
There never was, upon my word,
A single song so true.

Yet I am told you pilfer songs,
Yes, any song you chance to hear,
And never doubt if it belongs
To you, you buccaneer.

“But tell me, sir, if I am deft
At adding songs to my own store,
And yet if all the songs are left
Just as they were before,

And yet if all the songs are left
Beauty as any bird has lief,
The song of whip-poor-will and dove
And thrush—am I a thief?

“Of course, dear sir, you never heard
A song, a single song, so true!”
Good-morning, Mr. Mocking-Bird.

“Good-morning, sir, to you!”

Whitter Bynner.

WILD GEESE

Up in the air a line of black
That zigzags to and fro;
Off to the south with honking call
The dark specks hurrying go.

I watch them with reluctant eyes
Fast speeding from my view;
Across the gray of autumn skies
They keep their passage true.

Brave voyagers, the chart you bear
Is one I fain would learn;
You have no thought or anxious care
Concerning your return.

Yet ere the bluebird builds her nest
The wild geese home will fly
With honking call, by spring possessed,
Across an azure sky.

Helen M. Richardson.

IF I WERE A BIRD

If were a little bird
I would live high in a tree,
Where little boys and girls
Could never bother me.

And there I would build my nest
And lay three eggs of blue,
Where little stars could watch
All the long night through.

My mate could sit beside me
As he would like to do,
And listen to the hoot-owl
Say, hoo-hoo-are you?

By Flora Wonnacott, age 11.

THE ALPHABET OF BIRDS

- A is for auk who lives near the wet,
B is for blackbird with body of jet.
C stands for canary with bright yellow hue,
D stands for dove with her love-making coo.
E is for eagle of whom we've all heard.
F is for falcon the great-footed bird.
G is for goldfinch whose plumage is rare,
H is for hawk with a hostile air.
I stands for ibis with a cylindrical bill.
J stands for blue jay with a voice that is
 shrill.
K is for kingfisher whose bill is quite long,
L is for lark with her beautiful song.
M stands for mockingbird who can imitate
 song,
N stands for nightingale who sings the night
 long.
O is for owls, the wise-looking birds,
P is for parrot, who repeats many words.
Q is for quail who is an edible thing.
R is for robin who comes first in the spring.
S is for sparrow who stays the year round,
T is for teal; in the water they're found.
U is a letter for which we find none,
V is for vulture who feeds on carrion.
W is for wren; X, we have none;
Y is for yellowhammer; Z, we are done.

Earl Woodunder.

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